## STANDARD PLANS

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BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION

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#### **FOREWORD**

This July 2004 edition of the California Department of Transportation Standard Plans is the fourth edition of the Department's Standard Plans based on metric values using the International System of Units (SI).

Symbols for (SI) metric units used in this July 2004 edition of the Standard Plans are shown on the included Standard Plan A10B, "Acronyms and Abbreviation".

The July 2004 edition of the Standard Plans is supported by the July 1999 edition of the California Department of Transportation Standard Specifications.



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Trail

Dirt Road

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Spot Elevation

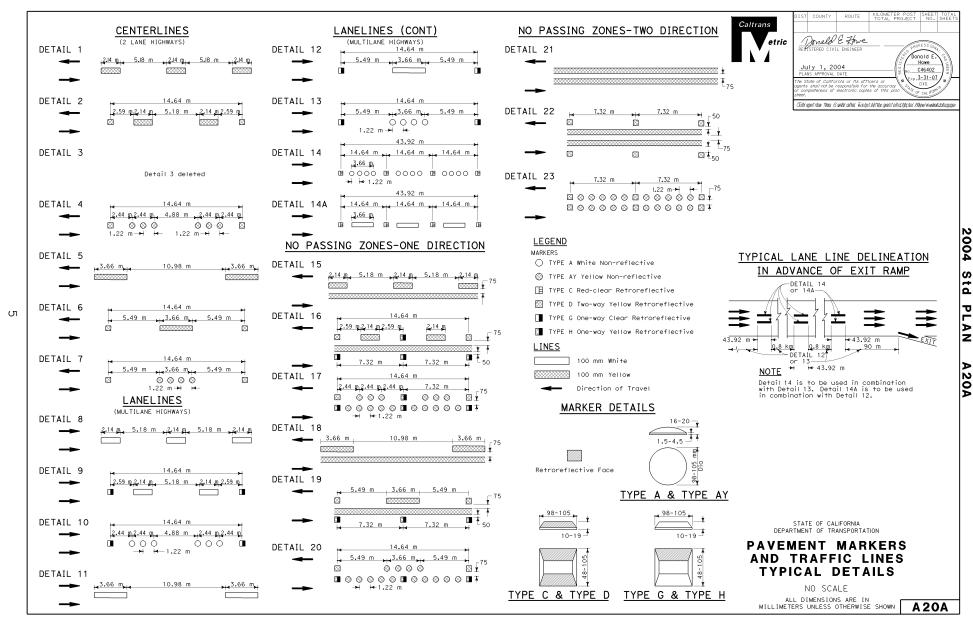
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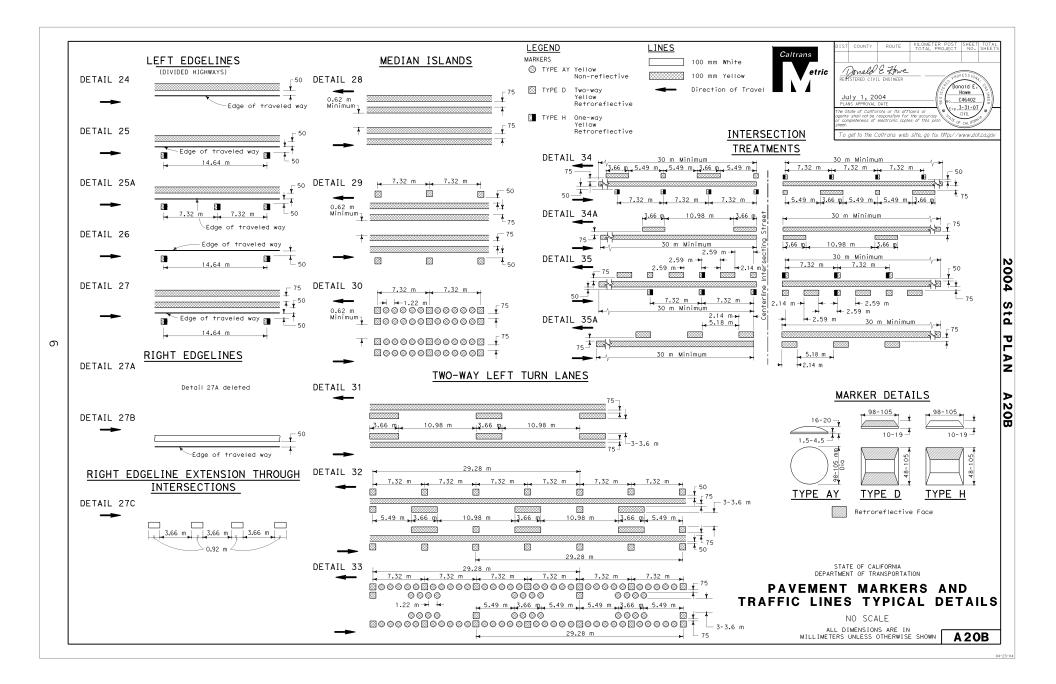
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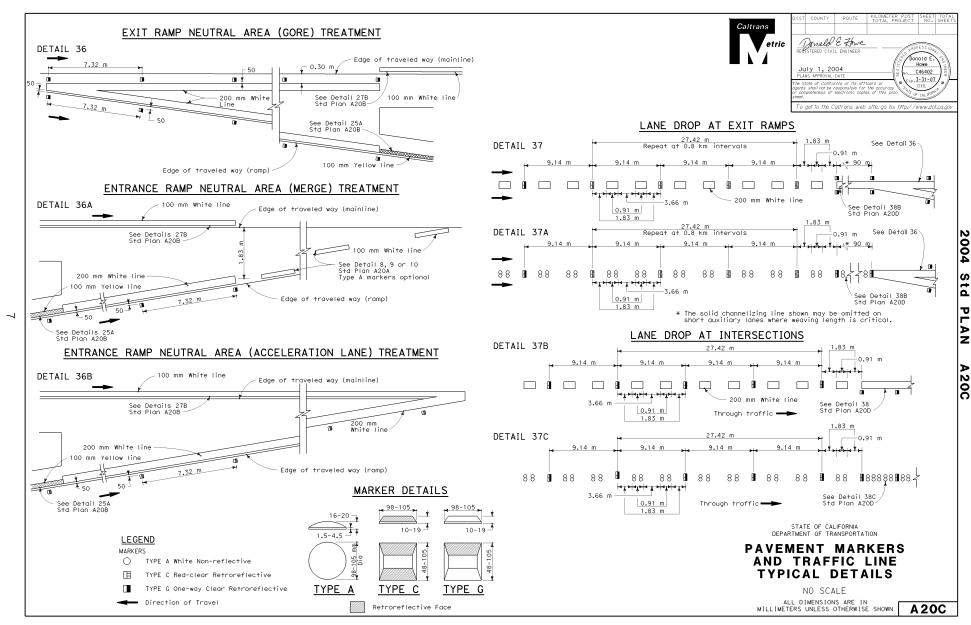
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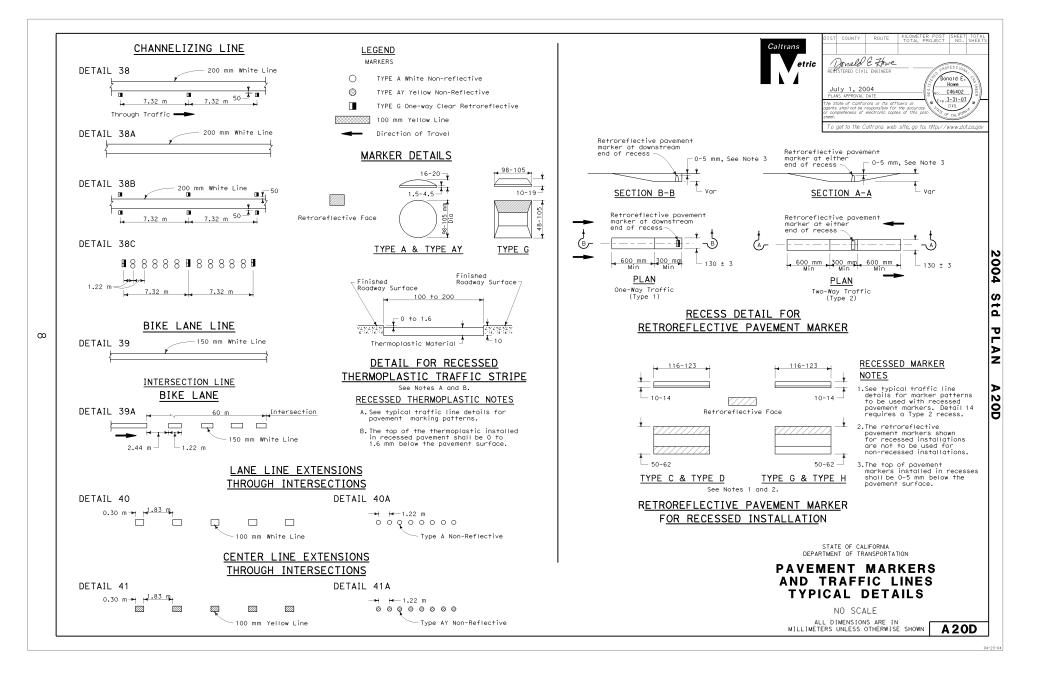
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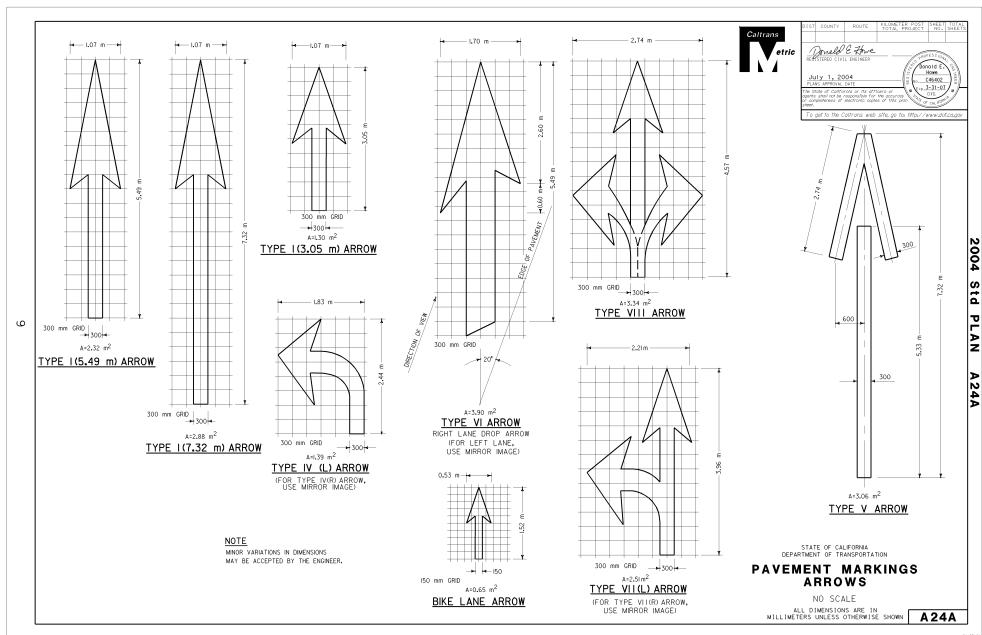


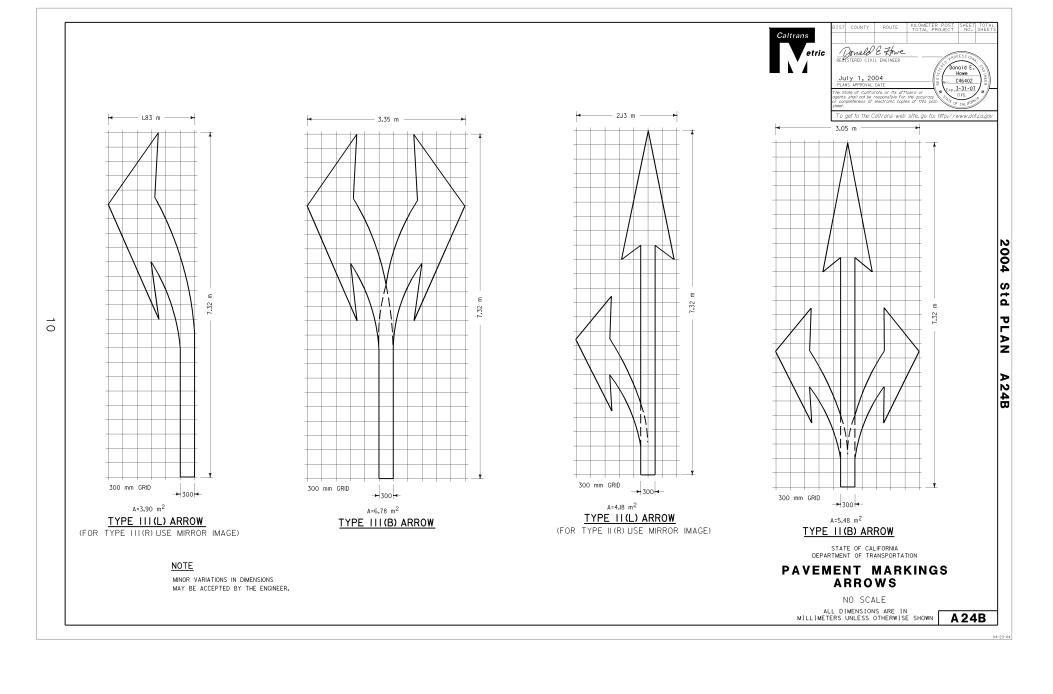
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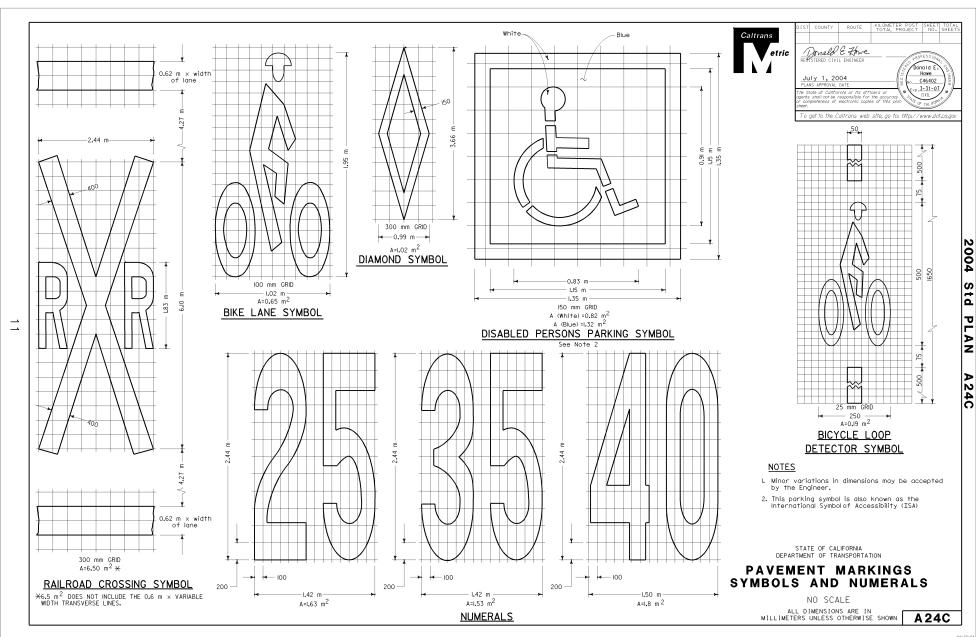




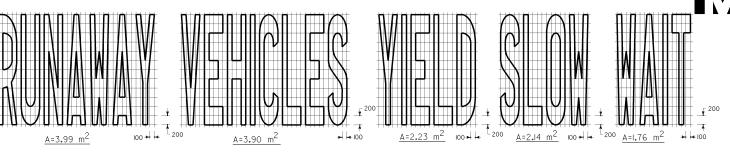


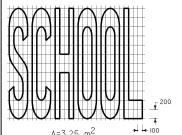


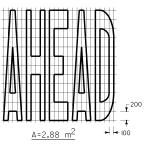


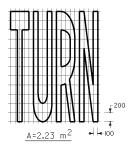


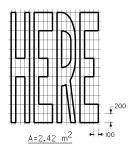






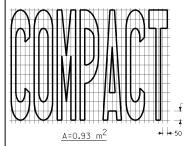




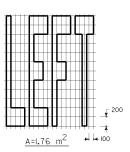


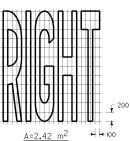


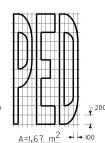
Caltrans











# A=0.46 m<sup>2</sup> 1 50

ROUTE KILOMETER POST TOTAL PROJECT

get to the Caltrans web site, go to: http://www.dot.ca.

→ 100

Donald E Howe

. C46402 ×p. 3-31-07

Donald & Howe

July 1, 2004

NOTES

- (1) If a message consists of more than one word, it should read "UP", i.e., the first word should be nearest the driver.
- (2) The space between words should be at least four times the height of the characters for low speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions,
- (3) Minor variations in dimensions may be accepted by the Engineer.
- (4) Portions of a letter, number or symbol may be separated by connecting segments not to exceed 50 mm in width.

WORD MARKINGS							
ITEM	m2	ITEM	m2	ITEM	m <sup>2</sup>	ITEM	m 2
XING	1.95	YIELD	2,23	BIKE	0.46	PED	1.67
AHEAD	2.88	SCH00L	3.25	SLOW	2.14	COMPACT	0.93
WAIT	1.76	SIGNAL	2.97	STOP	2.04	RUNAWAY	3.99
LANE	0.56	TURN	2.23	LEFT	1.76	VEHICLES	3.90
RIGHT	2,42	HERE	2.42				

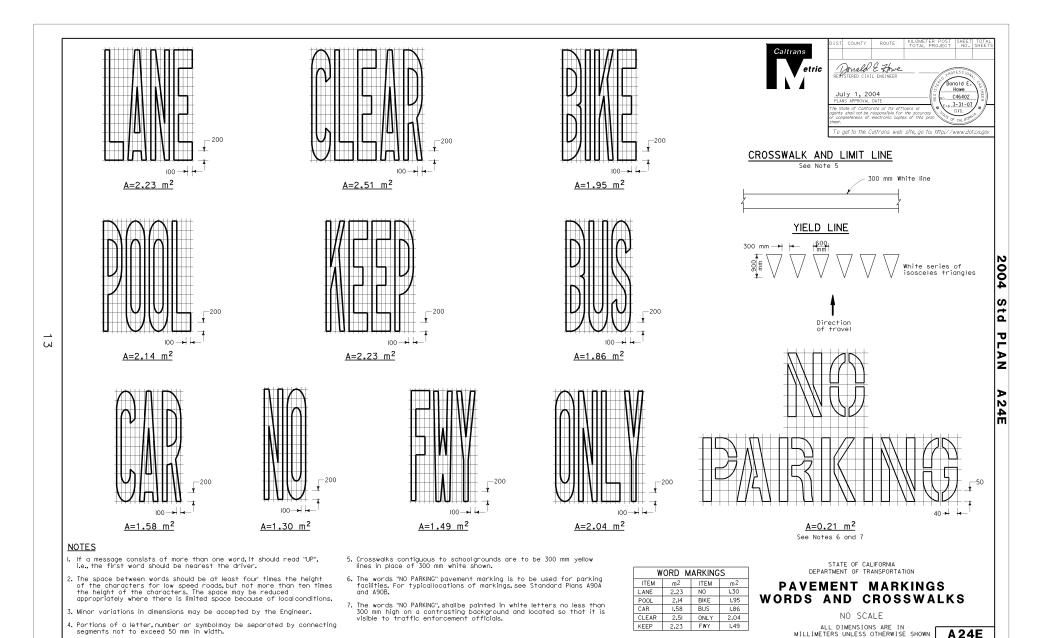
## STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PAVEMENT MARKINGS WORDS

NO SCALE

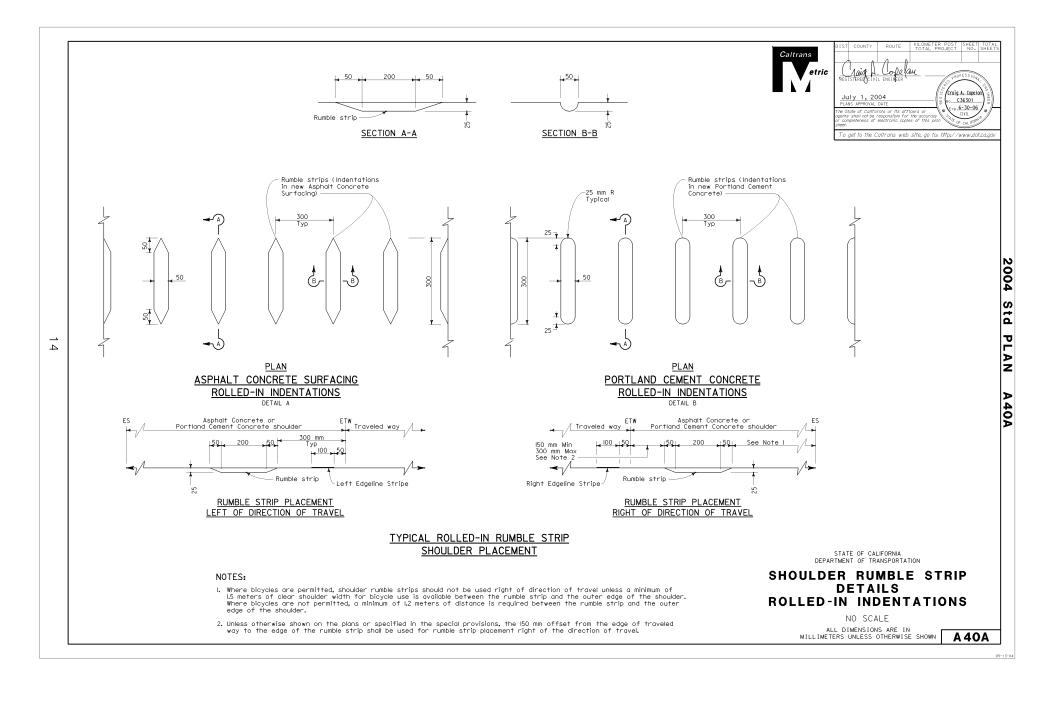
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

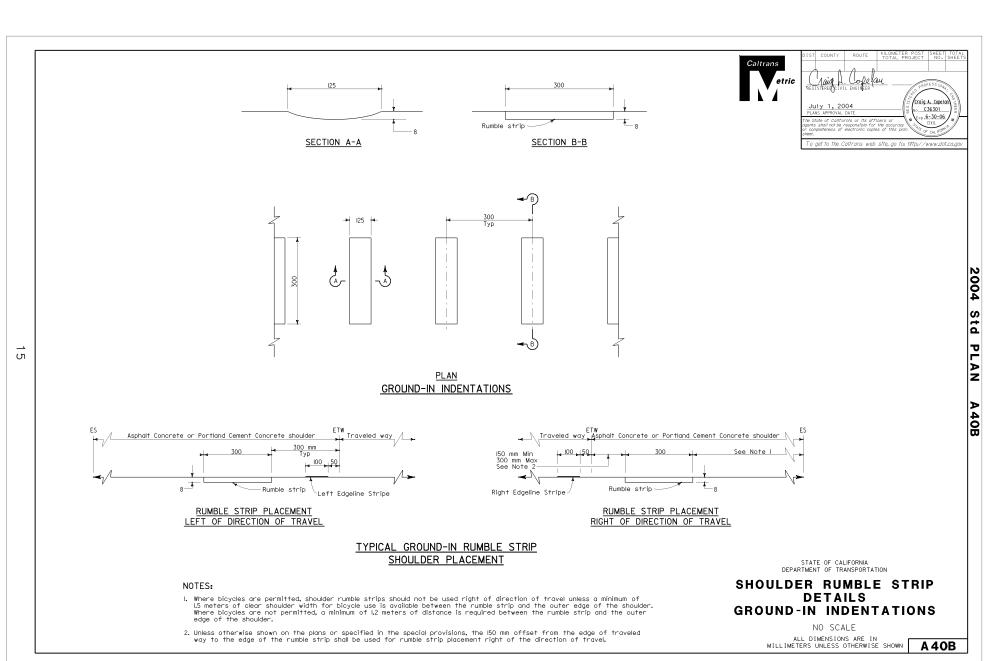
A 24D

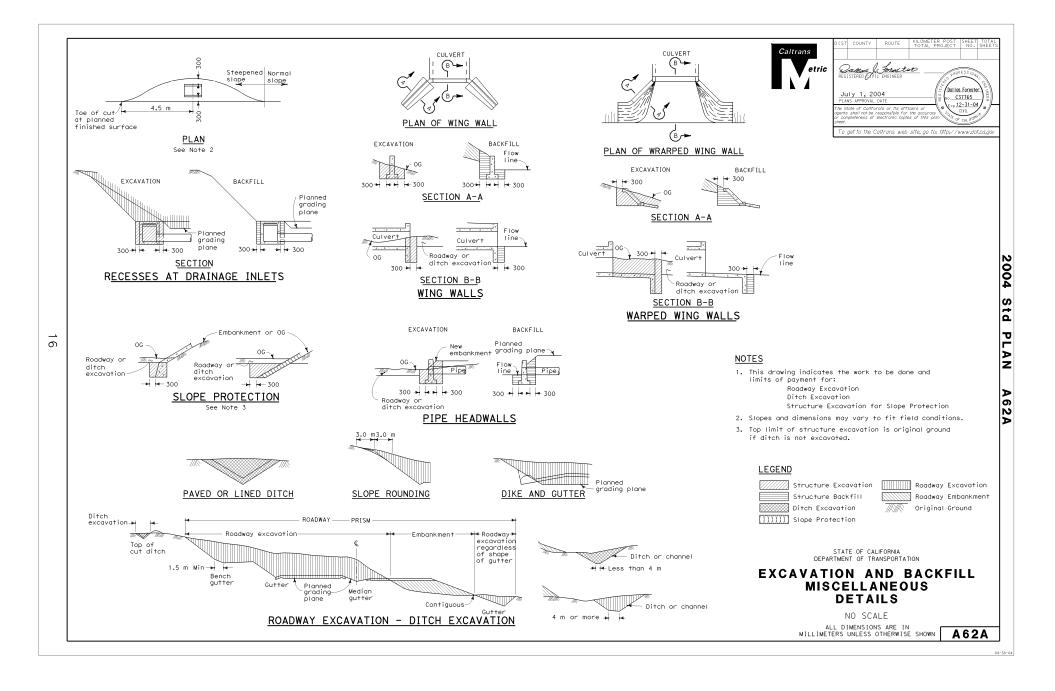
2004 Std PLAN

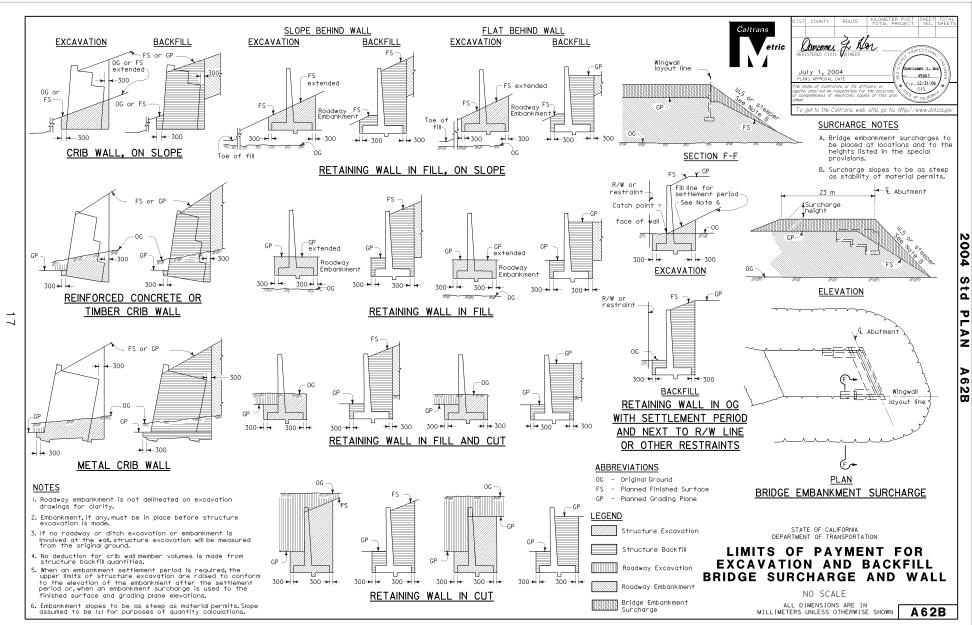


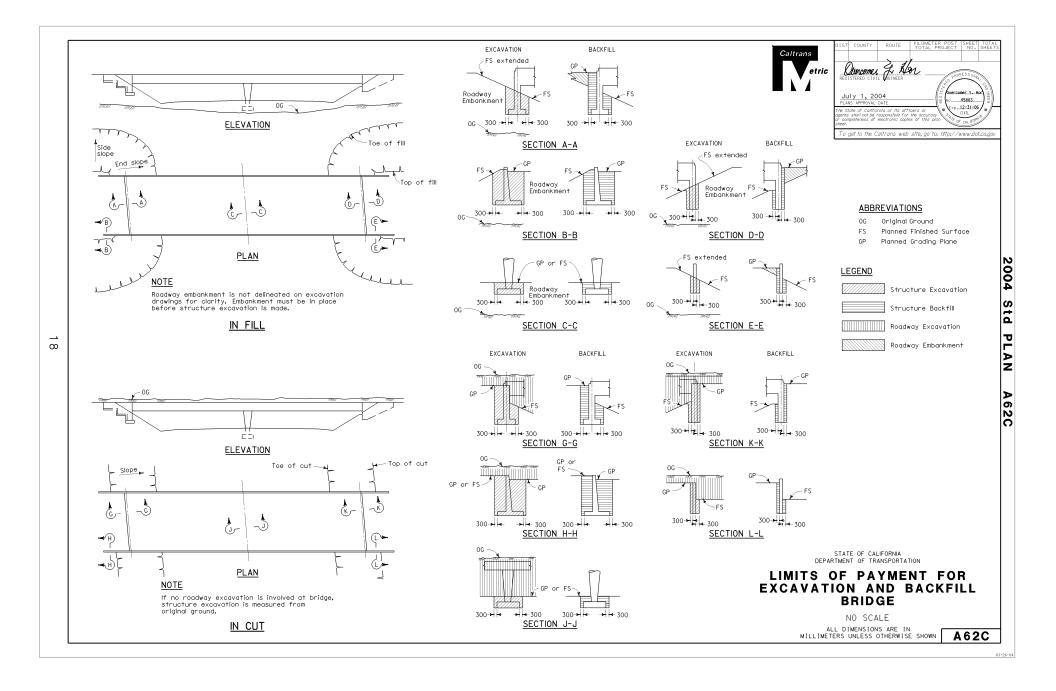
A 24E

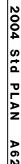


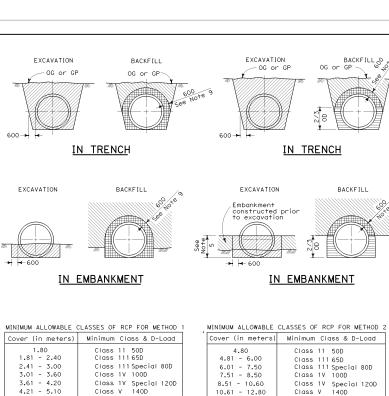


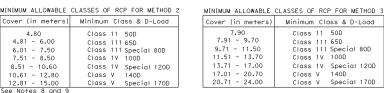












METHOD 2

REINFORCED CONCRETE PIPE

See Notes 1, 2, 7 and 10

#### METHOD 3

## Caltrans Dallas Forester C37765 p 12-31-04 CIVIL To get to the Caltrans web site, go to: http://www.dot.ca.go

EXCAVATION BACKETLL

EXCAVATION BACKFILL

SAND BEDDING SOIL CEMENT BEDDING 1. Unless otherwise shown on the plans or specified in the special provisions, the Contractor shall have the option of selecting the class of RCP and the method of backfill to be used, provided the height of cover does not exceed the value shown for the RCP selected.

#### Example:

600 mm RCP culvert with maximum cover of 5.80 m the options are:

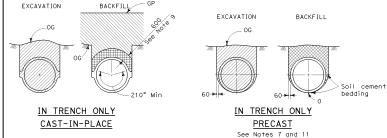
- a) Class V Special or stronger with Method 1.
- b) Class 111 or stronger with Method 2. c) Class 11 or stronger with Method 3.

Cover is defined as the maximum vertical distance from top of pipe to finished grade within the length of any given culvert.

- 2. The class of RCP, method of backfill and bedding selected shall be the same throughout the length of any given culvert.
- 3. The ''length of any culvert" is defined as the culvert between:
  - a) Successive drainage structures (inlets, junction boxes, headwalls, etc.). b) A drainage structure and the inlet or outlet end of the culvert.
  - c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
- 4. Slope or shore excavation sides as necessary.
- 5. Embankment height prior to excavation for installation of all classes of RCP under Methods 2 and 3A shall be as follows: Pipe sizes 300 mm to 1050 mm I D = 750 mm

Pipe sizes 1200 mm to 2100 mm I D = 2/3 0D Pipe sizes larger than 2100 mm I D = 1500 mm

- 6. The maximum size for all classes of RCP placed under Method 1 is 1950 mm ID.
- 7. Non-reinforced precast pipe sizes 900 mm or smaller may also be placed under Methods 1, 2 or 3.
- 8. Oval or arch shaped RCP shall be placed under Method 2 only.
- 9. Embankment compaction requirements govern over the 90% relative compaction backfill requirement within 750 mm of finished grade.
- 10. Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimums.
- 11. Where the precast non-reinforced concrete pipe is used as a substitute for the cast-in-place pipe, both the wall thickness and the concrete strength shall be at least as great as that specified for the cast-in-place pipe. The fill height allowed shall not exceed that shown for the cast-in-place pipe.



Class V Special 170D

METHOD 1

9

5.11 - 6.00

See Notes 6 and 9

NON-REINFORCED CONCRETE PIPE

#### **LEGEND**

Structure Excavation (Culvert) Sand Bedding Structure Backfill (Culvert) Soil Cement Bedding 95% relative compaction |Structure Backfill (Culvert) |90% relative compaction Roadway Embankment 💹 Loose Backfill 7700000 Original Ground

- OD = Outside diameter for circular pipes and maximum vertical dimension for other shapes
- ID = Inside diameter for circular pipes and minimum vertical dimension for other shapes
- RCP = Reinforced concrete pipe

EXCAVATION BACKFILL

EXCAVATION BACKFILL

→ 600

90

600→

Embankmen<sup>a</sup> constructed prior to excavation OG or GP

IN TRENCH

constructed prior to

excavation-

SAND BEDDING SOIL CEMENT BEDDING

IN EMBANKMENT

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### **EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS**

NO SCALE





#### NOTES:

 Unless otherwise shown on the plans or specified in the special provision, the Contractor shall have the option of selecting the class of RCP and the type of installation to be used, provided the height of cover does not exceed the value shown for the RCP selected.

Example: 600 mm RCP culvert with maximum cover of 5.80 m the options are:

- a) Class III or stronger with Installation Type 1.
  b) Class III Special or stronger with Installation Type 2.
- c) Class IV Special or stronger with Installation Type 3. Cover is defined as the maximum vertical distance from top of the pipe to finished grade within the length of any given culvert.
- The class of RCP and Installation Type selected shall be the same throughout the length of any given culvert.
- The "length of any culvert" is defined as the culvert between:

   Successive drainage structure (inlets, junction boxes, headwalls, etc.).
  - b) A drainage structure and the inlet or outlet end of the culvert.
  - c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
- 4. Oval and arch shaped RCP shall not be used.
- 5. 1/25 OD min, not less than 75 mm.
- 6. Slurry cement backfill may be substituted for backfill in the outer bedding and haunch areas. If slurry is used the outer and middle beddings shall be omitted. Prior to installation the soil under the middle 1/3 of the outside diameter of the pipe shall be softened by scorifying or other means to a minimum depth of 1/25 OD, but not less than 75 mm. Where slurry cement backfill is used clear distance to trench wall may be reduced as set forth in Section 19-3.062 of the Standard Specifications.
- Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimums.
- 8. Lower side shall be suitable material as determined by the Engineer. Otherwise it shall be considered unsuitable as set forth in Section 19-2.02 of the Standard Specifications. See Note 9.
- 9. Where the pipe is placed in a trench, if the trench walls are sloped at 5 vertical to 1 horizontal or steeper for at least 90 percent of the trench height or up to not less than 300 mm from the grading plane, the firmness of the soil in the lower side need not be considered.
- 10. Non-reinforced precast concrete pipe sizes 900 mm or smaller may be placed under installation Types 1, 2 or 3.

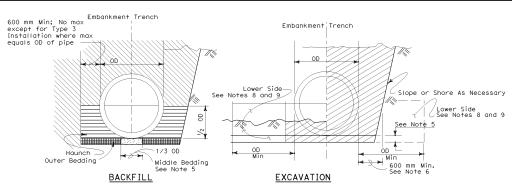
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

## EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS

NO SCAL

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A62DA



Roadway Embankment

Structure Backfill (Culvert) See Note 6

Loose Backfill

Roadway Embankment (Culvert) (Culvert)

Structure Backfill (Culvert) See Note 6

#### TYPE 1 INSTALLATION:

The hounch and outer bedding shall be compacted to a minimum 90 percent relative compaction. In addition, the minimum sand equivalent in these areas shall be 30 and the maximum percentage passing the 75  $\mu m$  sieve size shall be 12.

#### TYPE 2 INSTALLATION:

The haunch and outer bedding shall be compacted to a minimum 90 percent relative compaction. In addition, the minimum sand equivalent in these areas shall be 25.

#### TYPE 3 INSTALLATION:

The naunch and outer bedding shall be compacted to a minimum 85 percent relative compaction. 90 percent relative compaction will be required where the fill over the pipe is less than 1.2 meters or  $\frac{1}{2}$ 000.

#### INSTALLATION TYPE 1

MINIMUM CLASS AND D-LOAD	COVER (IN METERS)		
	2700 DIA. AND SMALLER	OVER 2700 DIA	
Class II 50D	4.50	4.00	
Class III 65D	4.51 - 6.40	4.01 - 5.80	
Class III Special 80D	6.41 - 8.20	5.81 - 7.60	
Class IV 100D	8.21 - 9.70	7.61 - 9.10	
Class IV Special 120D	9.71 - 12.50	9.11 - 11.90	
Class V 140D	12.51 - 15.20	11.91 - 14.30	
Class V Special 170D	15.21 - 18.00	14.31 - 17.70	

#### INSTALLATION TYPE 2

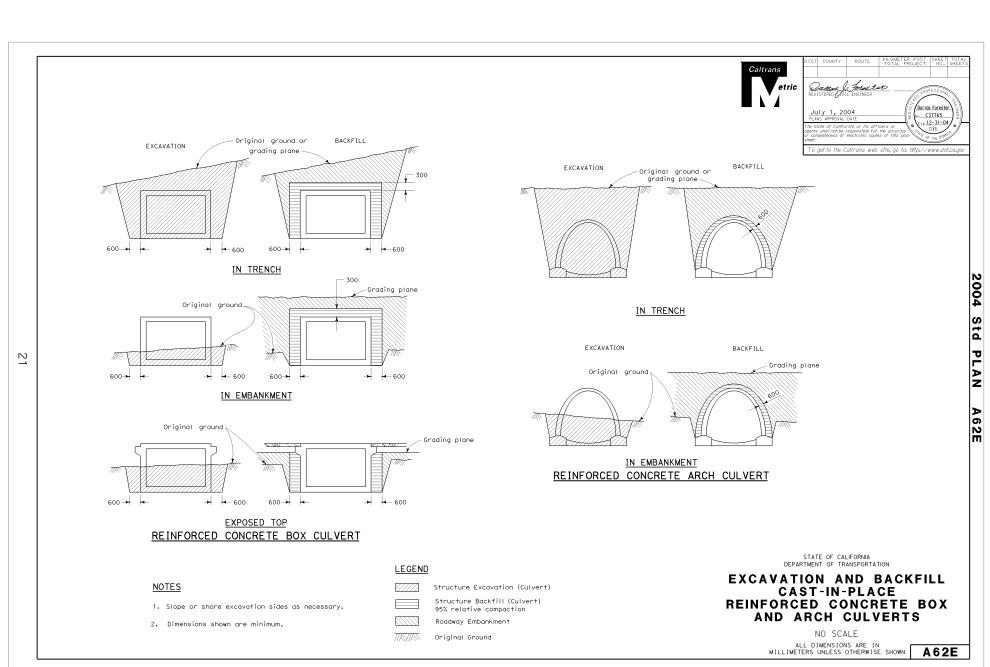
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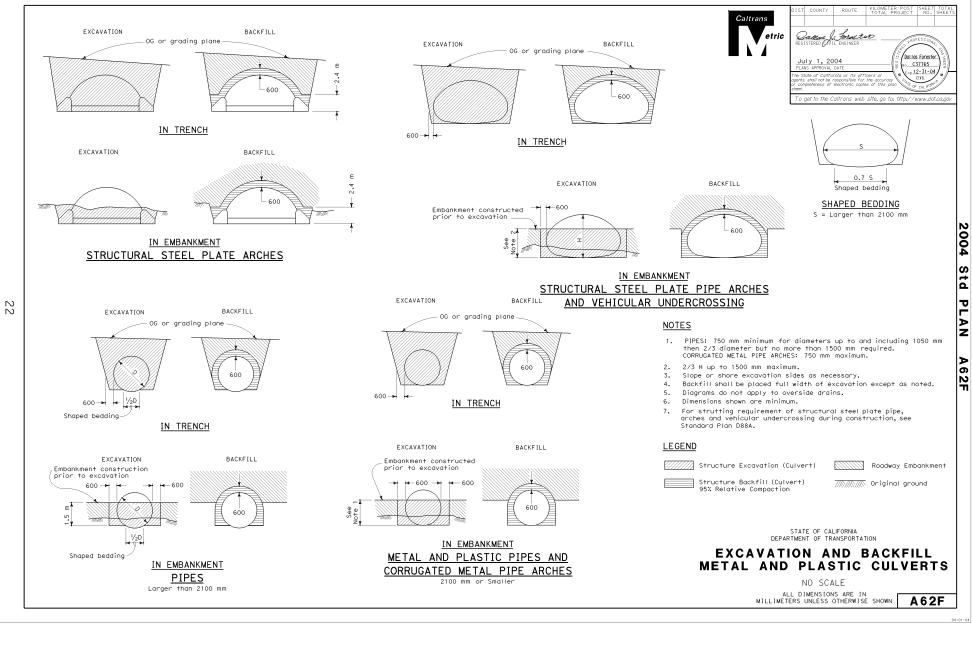
1.10 1.1122.11120.11 1.112 2				
MINIMUM CLASS AND D-LOAD	COVER (IN METERS)			
Class II 50D	3.00			
Class III 65D	3.01 - 4.60			
Class III Special 80D	4.61 - 6.10			
Class IV 100D	6.11 - 7.60			
Class IV Special 120D	7.61 - 9.80			
Class V 140D	9.81 - 11.90			
Class V Special 170D	11.91 - 14.30			

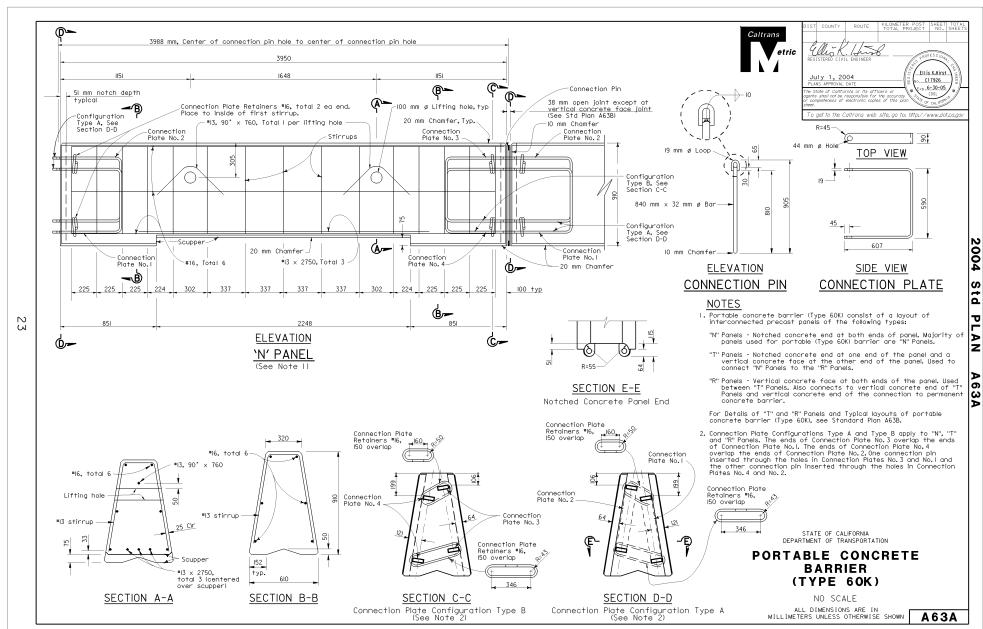
#### INSTALLATION TYPE 3

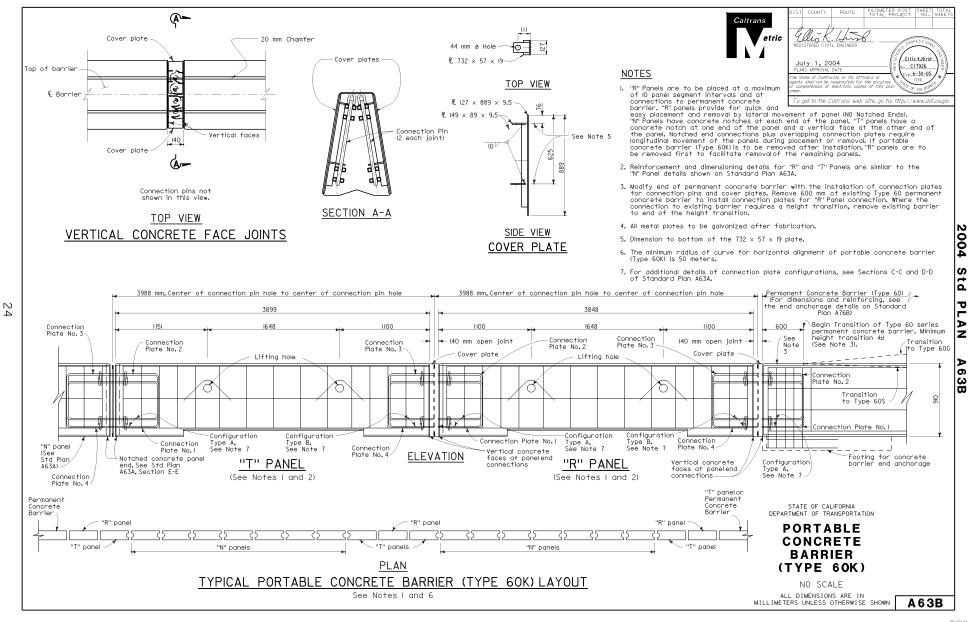
Excavation Structure

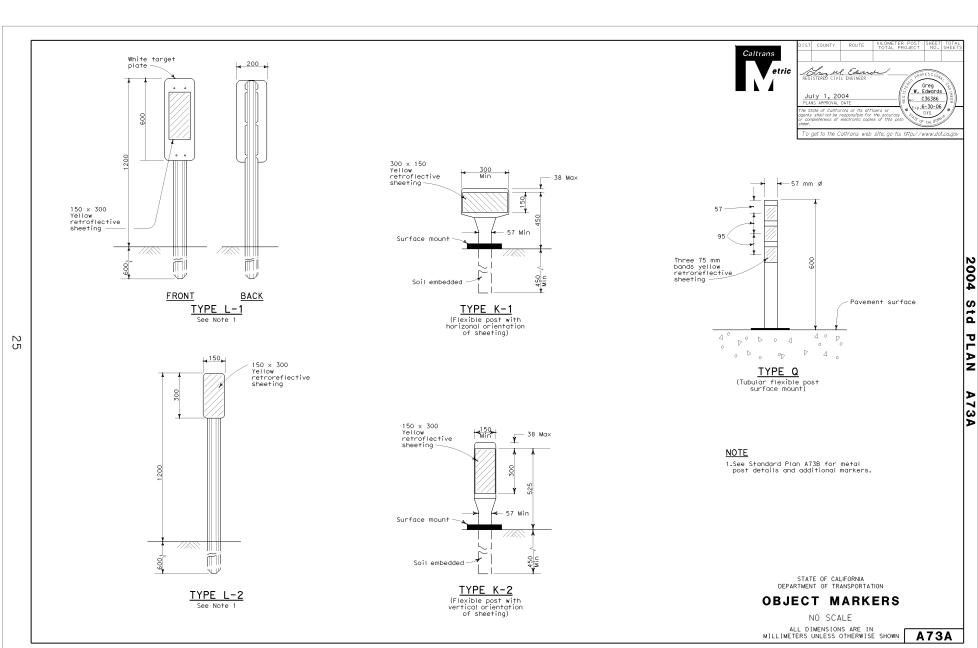
INSTALLATION THE S				
MINIMUM CLASS AND D-LOAD	COVER (IN METERS)			
	1200 DIA. AND SMALLER	OVER 1200 DIA		
Class II 50D	2.40	1.80		
Class III 65D	2.41 - 3.40	1.81 - 2.70		
Class III Special 80D	3.41 - 4.60	2.71 - 4.00		
Class IV 100D	4.61 - 5.50	4.01 - 4.90		
Class IV Special 120D	5.51 - 6.70	4.91 - 6.10		
Class V 140D	6.71 - 8.20	6.11 - 7.60		
Class V Special 170D	8.21 - 10.00	7.61 - 9.50		











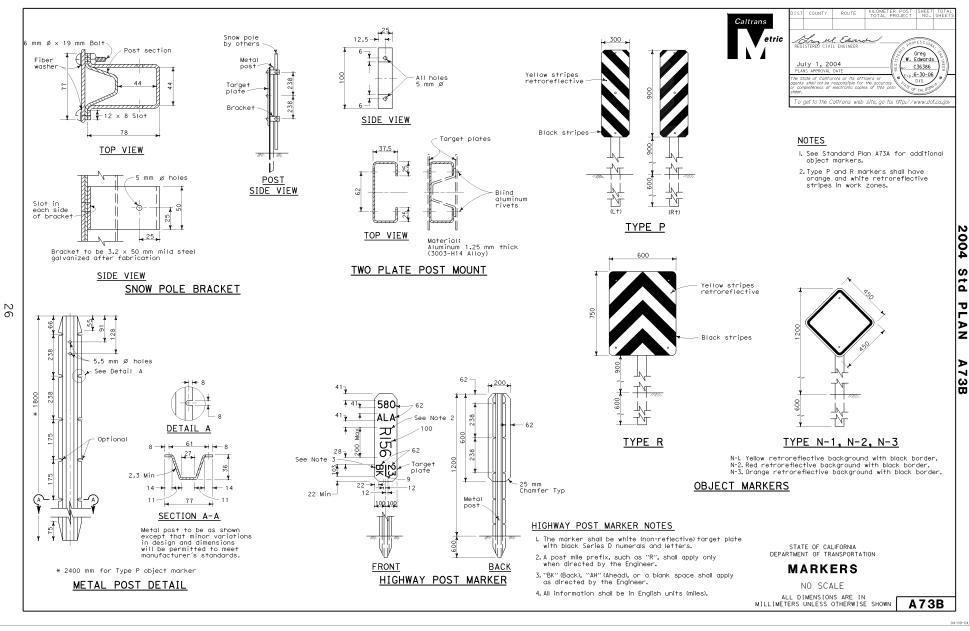






TABLE I - DELINEATORS RETROREFLECTIVE SHEETING TYPE FRONT BACK White White (See Note I) White None Yellow None Yellow (See Note I) Yellow Red None

#### <u>NOTES</u>

- 1. The retroreflective sheeting used on the back of delineator shall be a minimum size of 75 mm  $\times$  75 mm.
- 2. The type of delineator to be installed will be designated on the plans.
- 3. All barricade stripes shall be retroreflective.
- 4. See Standard Plan A73B for Metal Post Details.
- 5. Unless shown otherwise on the plans, or as directed by the Engineer, the color of the retroreflective sheeting for permanent channelizers shall conform to the color of the pavement markings it supplements.
- 6. Except, Class 1 (Flexible Post) temporary delineators and temporary channelizers in work zones shall be orange post with white retroreflective

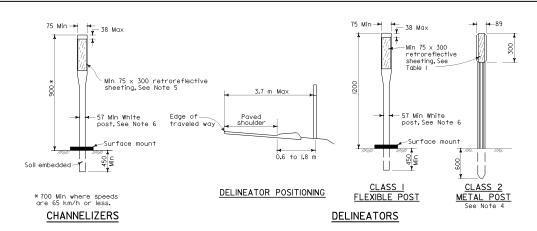
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

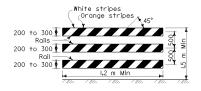
#### **DELINEATORS, CHANNELIZERS** AND BARRICADES

NO SCALE

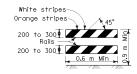
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A73C





TYPE III BARRICADE



White stripes-Orange stripes-200 to 300

TYPE I BARRICADE

TYPE II BARRICADE

### BARRICADES (See Note 3)

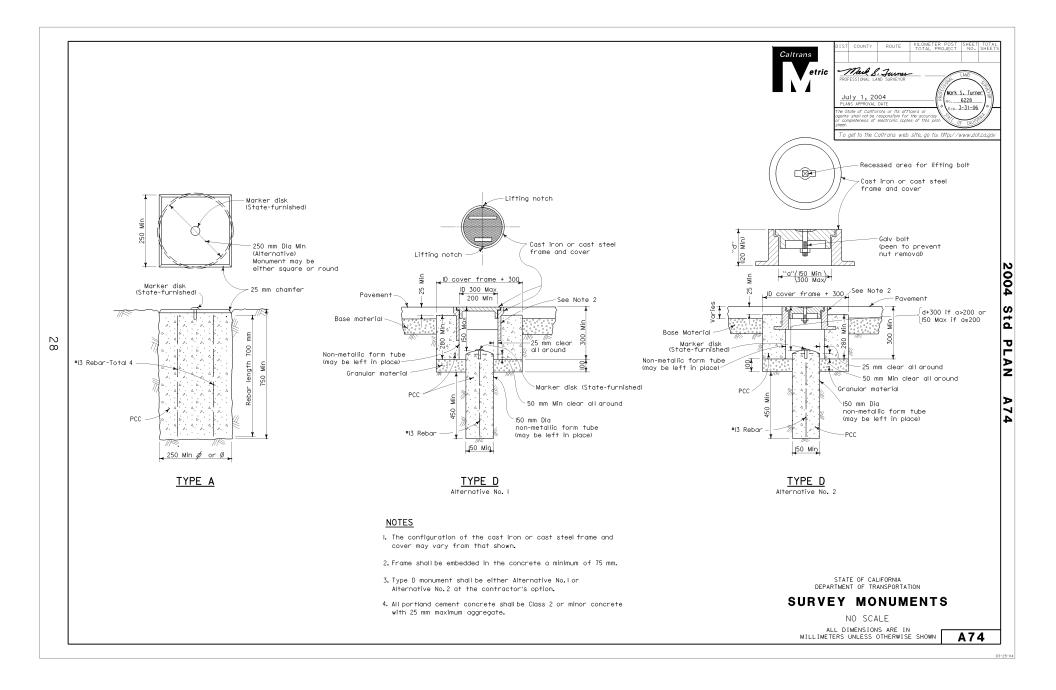
Only face of rails shown. Barricade construction materials and supports as specified in the specifications.

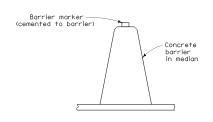
TABLE 2 - BARRICADES				
BARRICADE	TYPE I	TYPE II	TYPE III	
Width of Rail	200 Min-300 Max *	200 Min-300 Max *	200 Min-300 Max *	
Length of Rall	0.6 m Min	0.6 m Min	I.2 m Min	
Width of Stripes * *	150	150	150	
Height	0.9 m Min	0.9 m Min	I.5 m Min	
Number of Retroreflective Rail Faces	2 (one each direction)	4 (two each direction)	3 if facing traffic in one direction 6 if facing traffic in two direction	

- \* For the wooden option dimensions are nominal lumber dimensions.
- $\star$   $\star$  For rails less than 0.9 m long, 100 mm wide stripes shall be used.

#### NOTE A

Barricades to have a minimum of 0.17 m<sup>2</sup> of retroreflective area facing traffic when used on freeways, expressways, and other high speed highways.

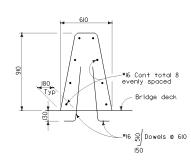




#### CONCRETE BARRIER TYPE 60 DELINEATION

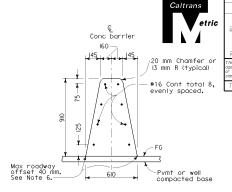
See Notes 7 and 8

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#### CONCRETE BARRIER TYPE 60A

Details similar to Type 60 except as noted.



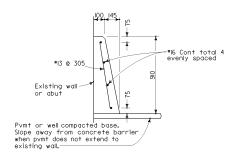
Ellis K.Hirst C17926 6-30-05 CIVIL To get to the Caltrans web site, go to: http://www.dot.ca.go

CONCRETE BARRIER TYPE 60

## Conc barrier Optional const jt -#I3 Total 4 ₽₩ 99 ■13 ∐ @ 305 See Note 9 305 Varies Pymt or well compacted base Offset roadway surfaces

#### CONCRETE BARRIER TYPE 60C

Details similar to Type 60 except as noted. Concrete barrier end anchor when necessary.



CONCRETE BARRIER TYPE 60D

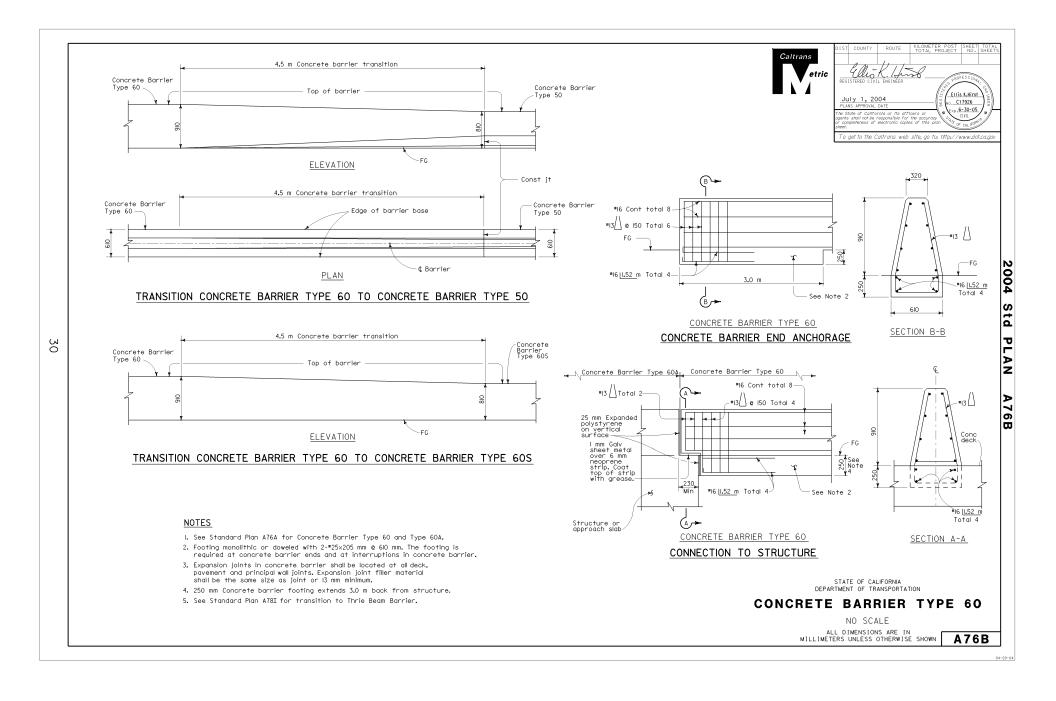
#### NOTES

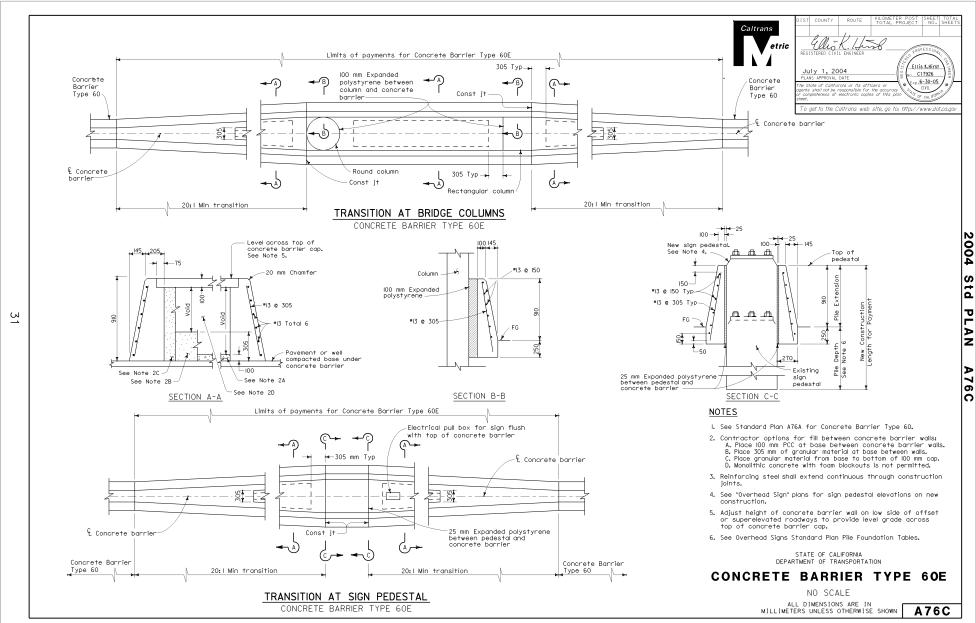
- I. See Standard Plan A76B for details of Concrete Barrier Type 60 end anchors, connection to structures and transitions to Concrete Barrier Type 50 and Concrete Barrier Type 60S.
- 2. See Standard Plan A76C for Concrete Barrier Type 60 transitions at bridge column and sign pedestals.
- 3. Where glare screen is required on Concrete Barrier Type 60, use Concrete Barrier Type 60G.
- 4. Where the concrete barrier is added to the face of existing concrete structure, match existing weep holes.
- 5. Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm minimum.
- 6. Where roadway offset is greater than 40 mm, see Concrete Barrier Type 60C.
- 7. Barrier delineation to be used when required by the Special Provisions.
- 8. Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- 9. Reinforcing stirrup not required for roadway offsets less than 305 mm.

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#### **CONCRETE BARRIER TYPE 60**

NO SCALE





ROUTE KILOMETER POST TOTAL PROJECT

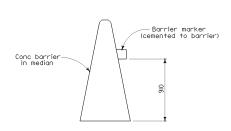
# Caltrans

<u>1</u>50 25 Optional Const Jt ξĚ #I3 total 4 를 #13 ∐ @ 305 98 See Note 7 Var Pvmt or well — compacted base Offset roadway surfaces

€ Conc barrier

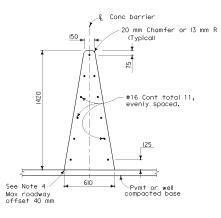
#### CONCRETE BARRIER TYPE 60GC

Details similar to Type 60G except as noted.



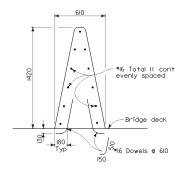
#### CONCRETE BARRIER TYPE 60G DELINEATION

See Notes 5 and 6



#### CONCRETE BARRIER TYPE 60G

(Monolithic concrete glare screen/barrier)



#### CONCRETE BARRIER TYPE 60GA

Details similar to Type 60G except as noted.

#### NOTES

- I. See Standard Plan A76E for details of Concrete Barrier Type 60G end anchors, connection to structures and transitions to Concrete Barrier Type 60.
- 2. See Standard Plan A76F for Concrete Barrier Type 60G transitions at bridge column and sign pedestals.
- 3. Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm minimum.
- 4. Where roadway offset is greater than 40 mm, see Concrete
- Barrier Type 60GC.
  5. Barrier delineation to be used when required by the Special Provisions.
- 6. Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- 7. Reinforcing stirrup not required for offsets less than 305 mm.

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#### **CONCRETE BARRIER TYPE 60G**

NO SCALE

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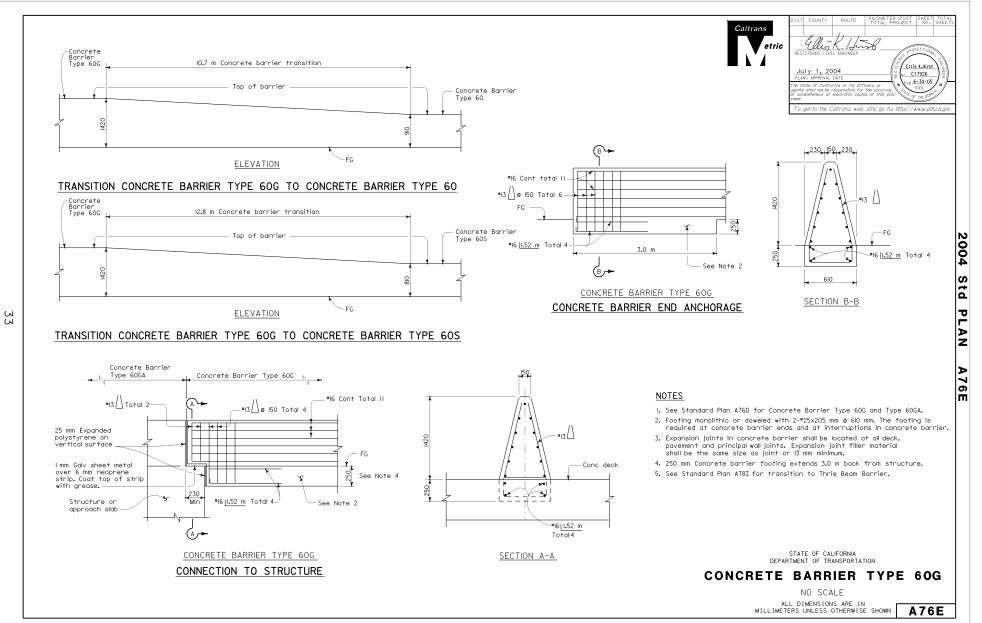
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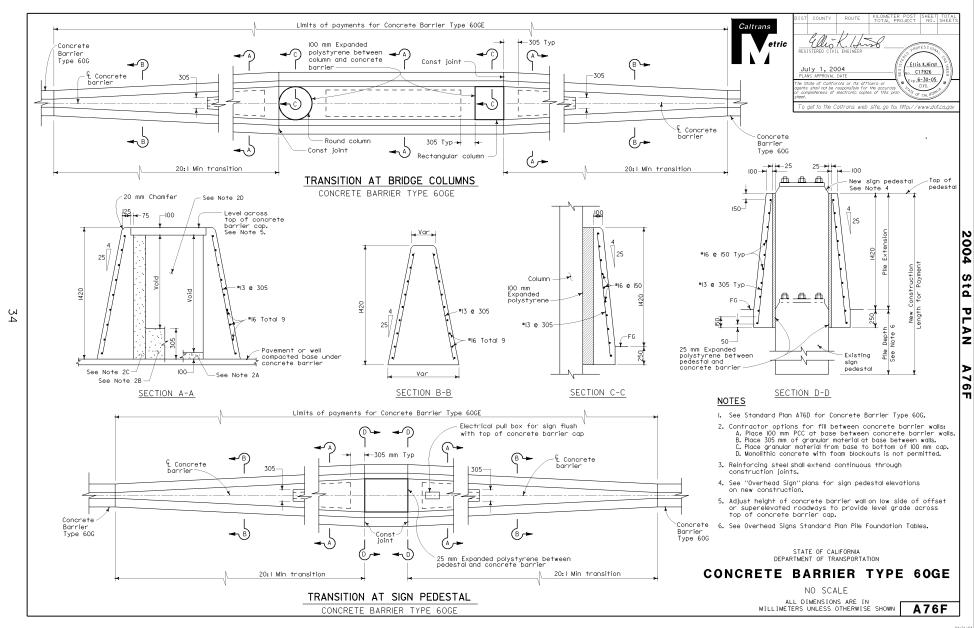
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Ellis K.Hirst C17926 6-30-05 CIVIL

20 mm Chamfer or 13 mm R (typical) #16 Cont total 8, evenly spaced.

Caltrans

-Pvmt or well

To get to the Caltrans web site, go to: http://www.dot.ca.go

Barrier marker (cemented to barrier) Concrete barrier in median

CONCRETE BARRIER TYPE 60S DELINEATION

See Notes 7 and 8

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-#16 Cont total 8 evenly spaced J80 Typ Bridge deck \*16 😭 Dowels @ 610

#### CONCRETE BARRIER TYPE 60SA

Details similar to Type 60S except as noted.

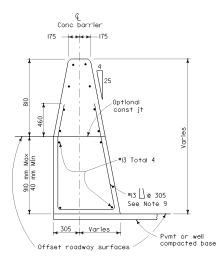
#### CONCRETE BARRIER TYPE 60S

Conc barrier

175 —

22

25



#### CONCRETE BARRIER TYPE 60SC

Details similar to Type 60S except as noted. Concrete barrier end anchor when necessary.

#### NOTES

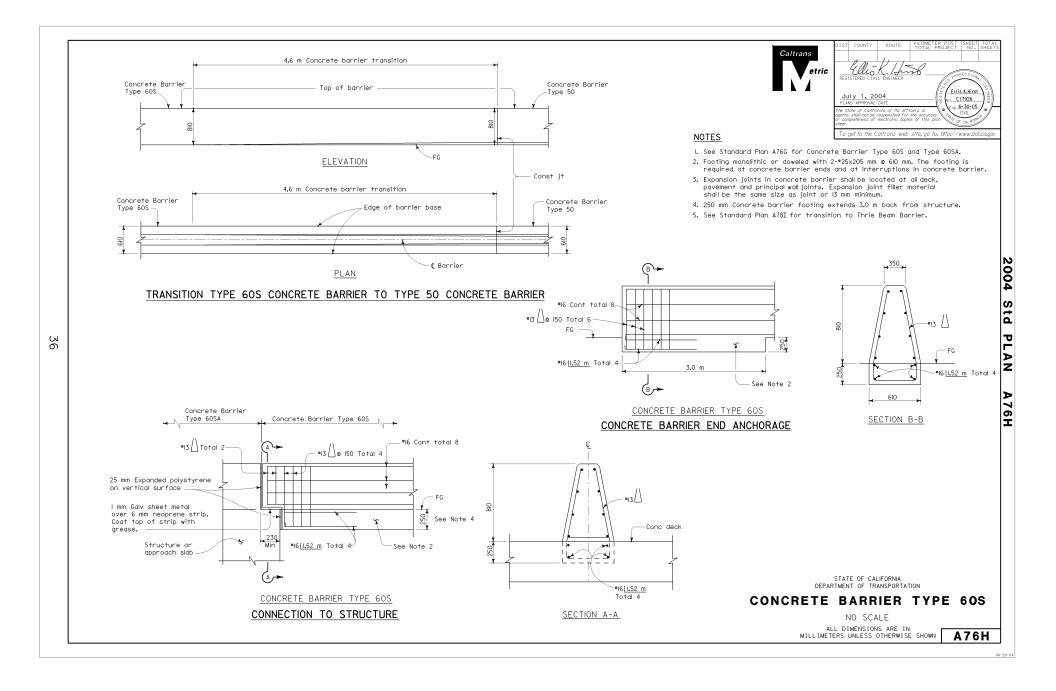
Max roadway offset 40 mm. See Note 6.

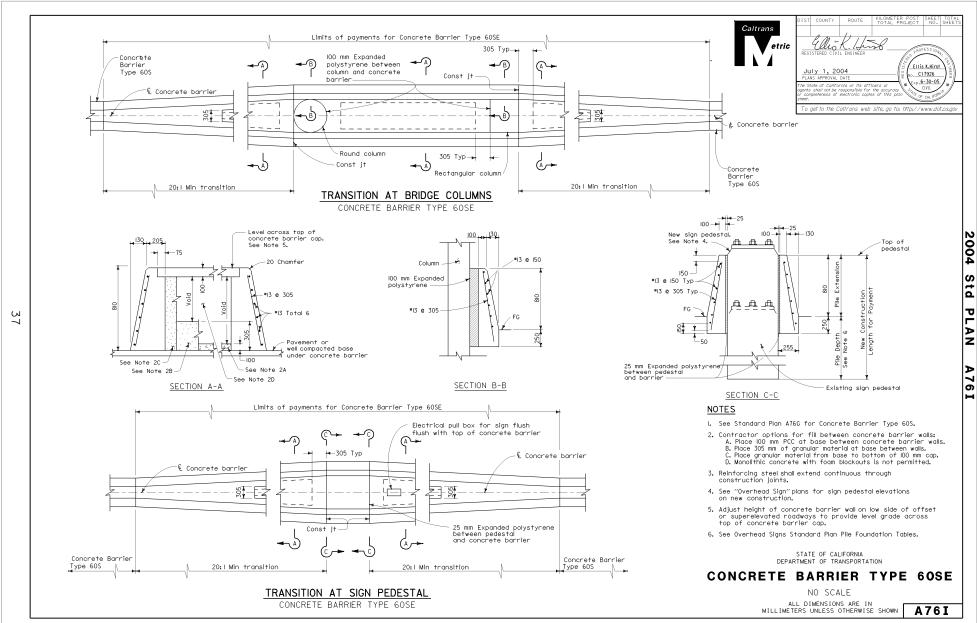
- I. See Standard Plan A76H for details of Concrete Barrier Type 60S end anchors, connection to structures and transitions to Concrete Barrier Type 50.
- 2. See Standard Plan A76I for Concrete Barrier Type 60S transitions at bridge column and sign pedestals.
- 3. Where glare screen is required on top of concrete barrier, use Concrete Barrier Type 60G.
- 4. Where the concrete barrier is added to the face of existing concrete structure, match existing weep holes.
- 5. Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm minimum.
- 6. Where roadway offset is greater than 40 mm, see Concrete Barrier Type 60SC.
- 7. Barrier delineation to be used when required by the Special Provisions.
- 8. Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- 9. Reinforcing stirrup not required for roadway offsets less than 305 mm.

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#### **CONCRETE BARRIER TYPE 60S**

NO SCALE





Caltrans etric

Conc barrier

145 | 50 | 50 | 45 | 20 mm Chamfer or 13 mm R, Typical

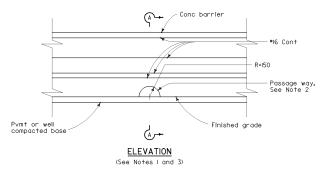
16 Cont total 8

Passage way

F6

Formula of the compacted base

SECTION A-A (Concrete Barrier Type 60 shown)



#### NOTES

- Type S Passage Way typically used for crossing of small size animals.
- 2. At the option of the Contractor, the passage way opening shall be constructed by using either the cast-in-place method, with the allowance of the form to be left in place, or once the barriler is constructed, drilling through the barrier to create the opening.
- 3. See Standard Plan A76A for typical details of Concrete Barrier Type 60.
- 4. Direction of traffic indicated by  $\longrightarrow$ .

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# CONCRETE BARRIER WILDLIFE PASSAGE WAY (TYPE S)

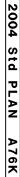
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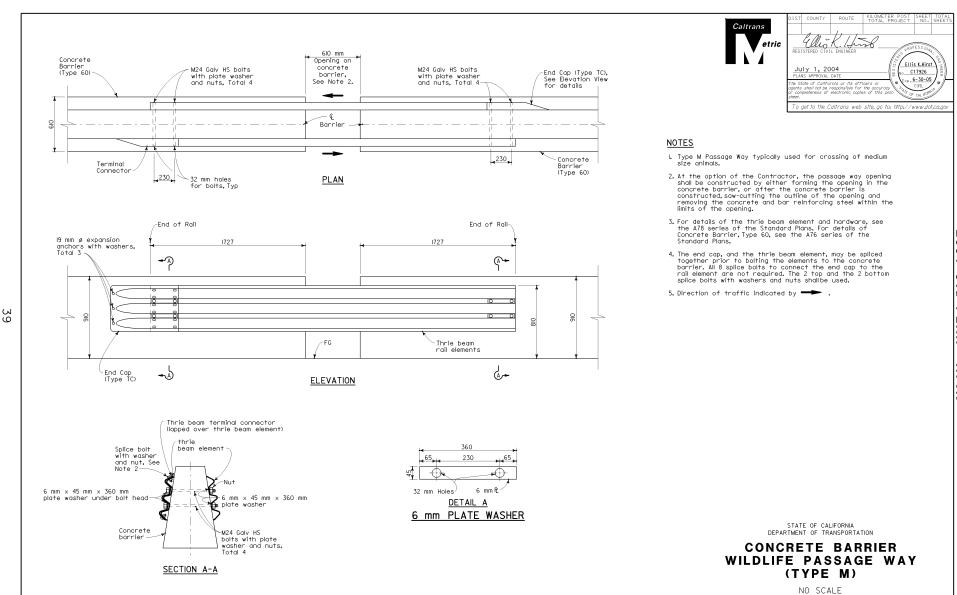
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A76J

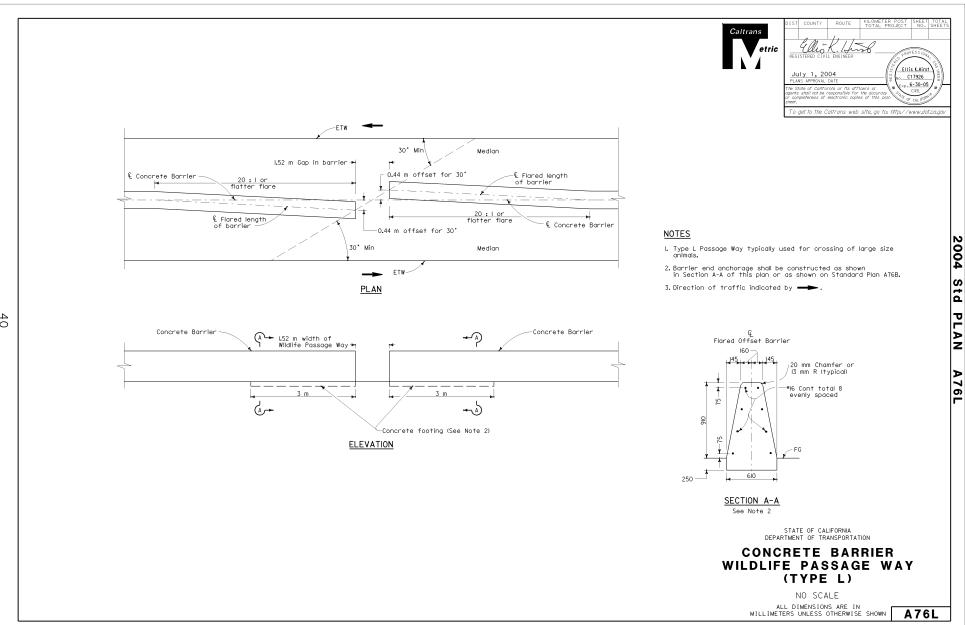
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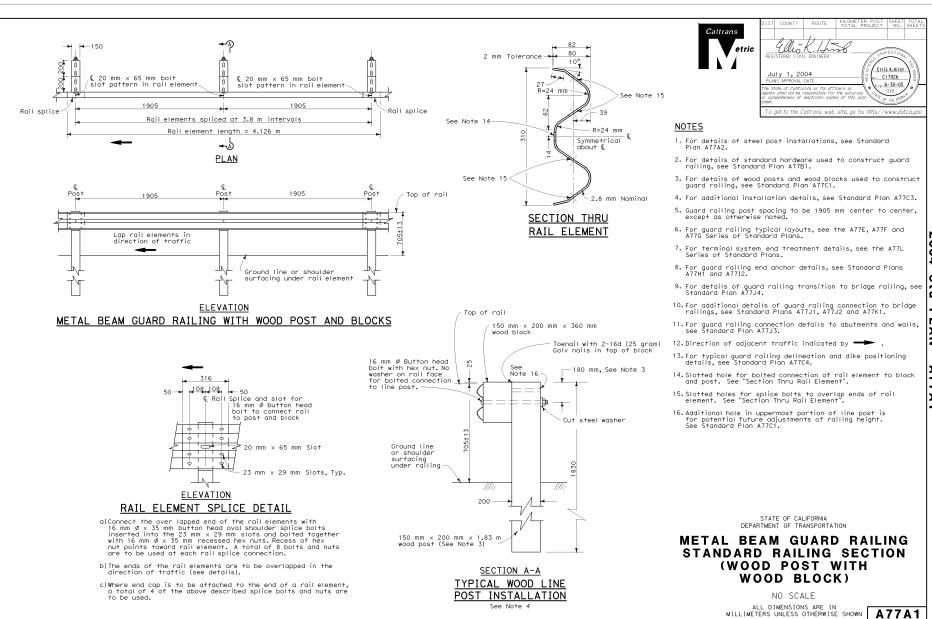


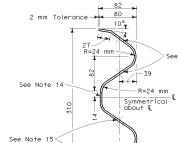


**A76K** 

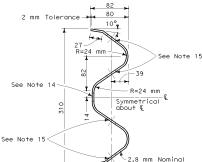












#### SECTION THRU RAIL ELEMENT

150 mm × 200 mm × 360 mm

#### **ELEVATION** METAL BEAM GUARD RAILING WITH STEEL POSTS AND NOTCHED WOOD OR NOTCHED PLASTIC BLOCKS

Rail elements spliced at 3.8 m intervals

Rail element length = 4.126 m

<u>PLAN</u>

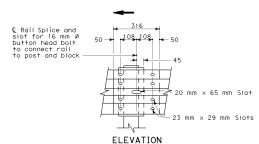
© 20 mm × 65 mm bolt slot pattern in rail element

Ground line or shoulder

surfacing under rail element

Rail Splice

Top of rail-



Post

Rail Splice

N

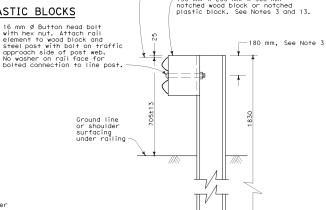
1905

© 20 mm × 65 mm bolt slot pattern in rail element

Lap rail elements in direction of traffic

### RAIL ELEMENT SPLICE DETAIL

- a) Connect the over lapped end of the rail elements with The map  $\alpha$  35 mm button head oval shoulder splice bolts inserted into the 23 mm x 29 mm slots and bolted together with 16 mm  $\beta$  x 35 mm recessed hex nuts. Recess of hex nut points toward rail element. A total of 8 bolts and nuts are to be used at each rail splice connection.
- b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).
- c) Where end cap is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used.



MW 150  $\times$  14 Steel post, 1.83 m length

Top of rail

SECTION A-A TYPICAL STEEL LINE POST INSTALLATION See Note 4





#### NOTES

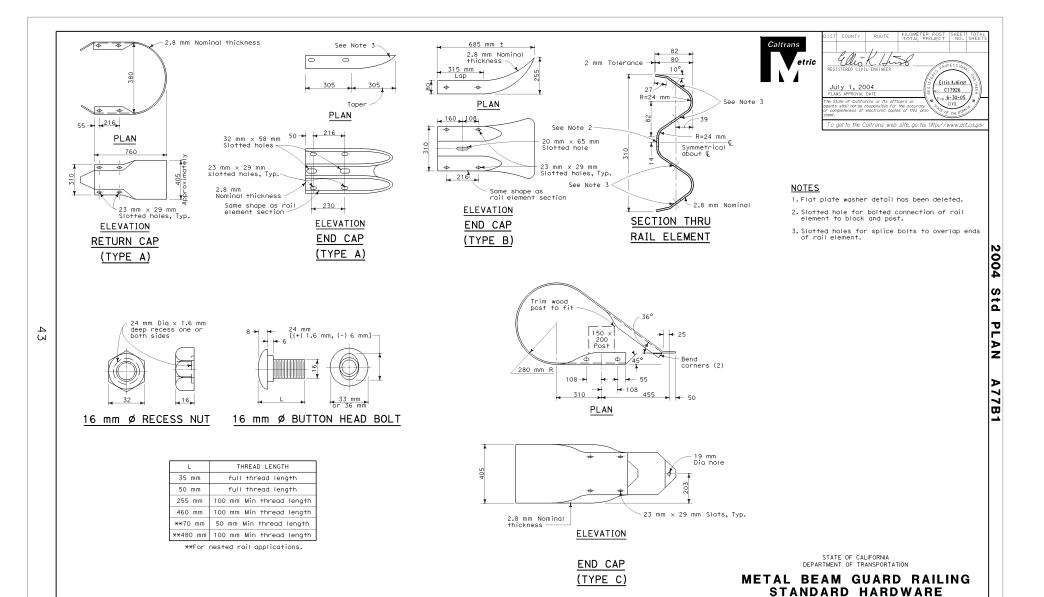
- 1. For details of wood post installations, see Standard
- 2. For details of standard hardware used to construct guard railing, see Standard Plan A77B1.
- For details of steel posts, wood blocks and plastic blocks used to construct guard railing, see Standard Plan A77C2.
- 4. For additional installation details, see Standard Plan A77C3.
- 5. Guard railing post spacing to be 1905 mm center to center, except as otherwise noted.
- 6. For guard railing typical layouts, see the A77E, A77F and A77G Series of Standard Plans.
- 7. For terminal system end treatment details, see the A77L Series of Standard Plans.
- 8. For guard railing end anchor details, see Standard Plans A77H1 and A77I2.
- For details of guard railing transition to bridge railing, see Standard Plan A77J4.
- For additional details of guard railing connection to bridge railings, see Standard Plans A77J1, A77J2 and A77K1.
- For dike positioning and guard railing delineation details, see Standard Plan A77C4.
- 12. Direction of adjacent traffic indicated by
- 13. Notched face of block faces steel post.
- 14. Slotted hole for bolted connection of rail element to block and post. See "Section Thru Rail Element".
- 15. Slotted holes for splice bolts to overlap ends of rail element. See "Section Thru Rail Element".

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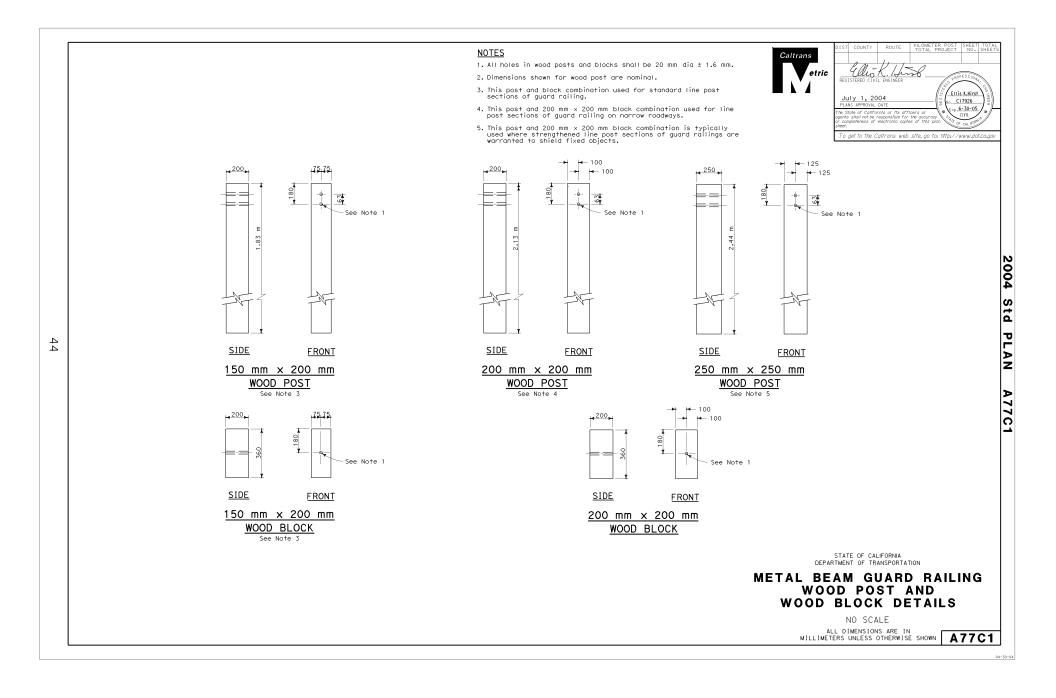
METAL BEAM GUARD RAILING STANDARD RAILING SECTION (STEEL POST WITH NOTCHED WOOD OR NOTCHED PLASTIC BLOCK)

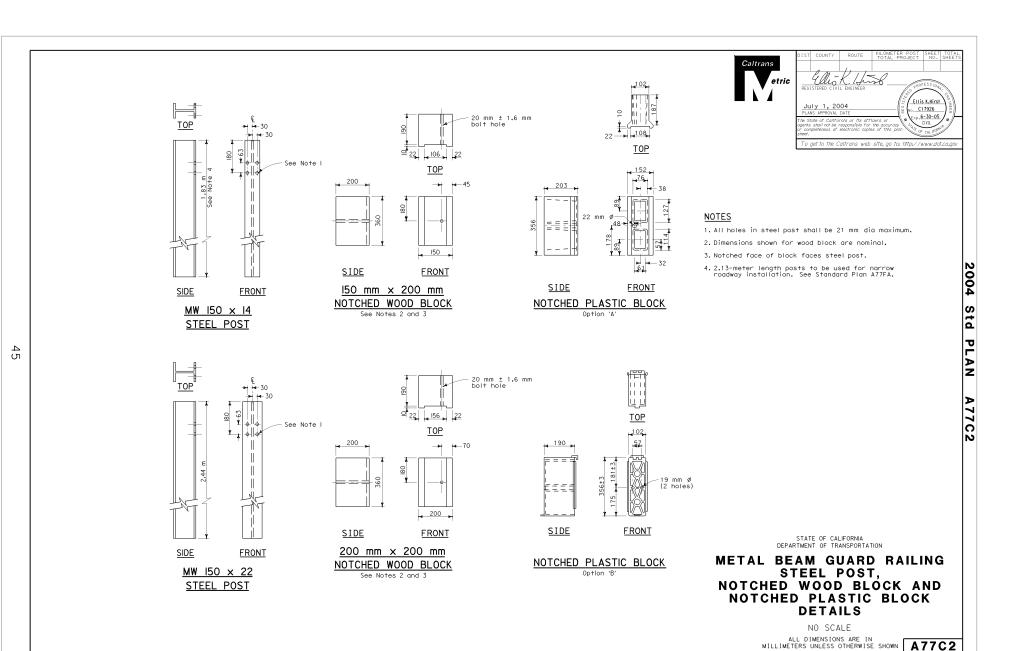
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

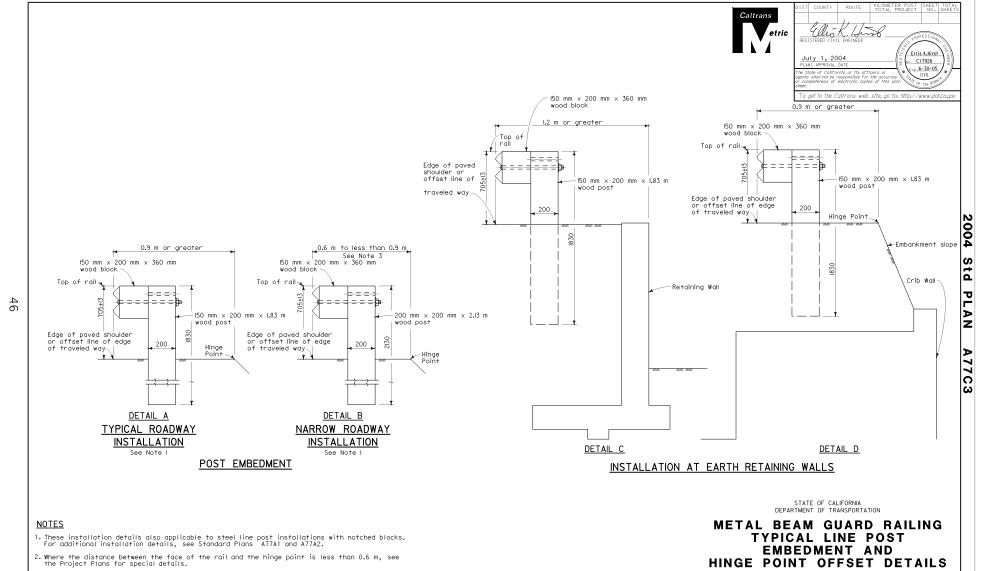
A77A2



NO SCALE







3. For dike positioning with guard railing installations, see Standard Plan A77C4.

NO SCALE

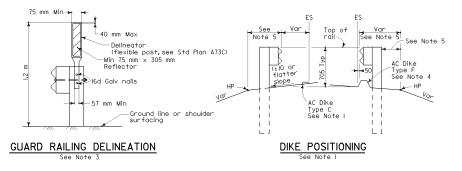
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A77C3

- 3. Guard railing delineation to be used where shown on the Project Plans.
- 4. When dike or curb is placed under guard railing, the moximum height of the dike or curb shall be 100 mm. Mountable dike should not be used. For dike and curb details, see Standard Plans A87A and A87B.
- 5. For details of typical distance between the face of rail and hinge point, see Standard Plan A77C3.



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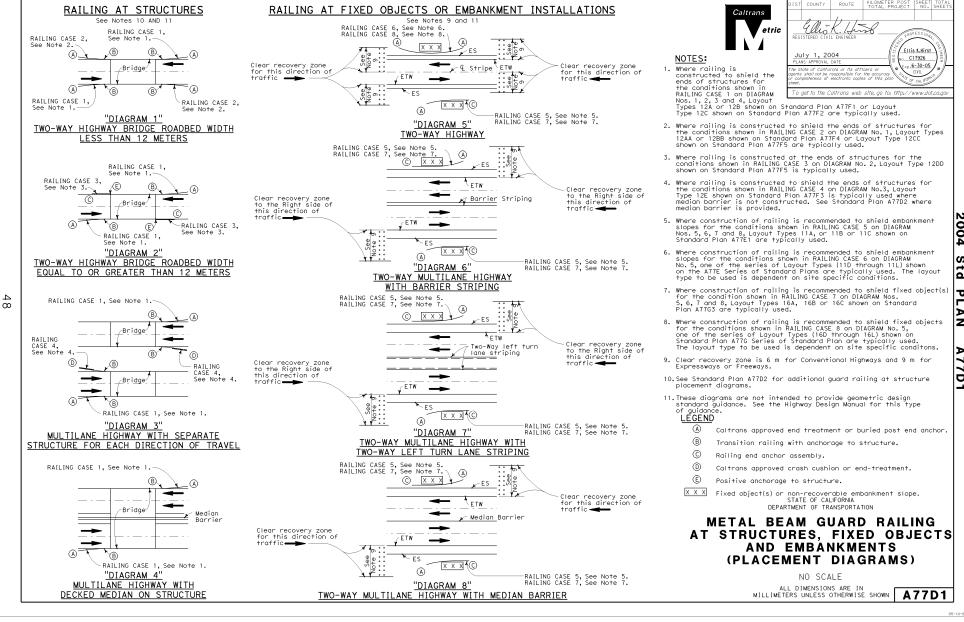
#### **METAL BEAM GUARD RAILING** TYPICAL RAILING DELINEATION AND DIKE POSITIONING DETAILS

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN A77C4

2004 Std PLAN





# Caltrans



#### NOTES:

- 1. Where guard railing is constructed to shield the ends of structures for the conditions shown in RAILING CASE 1 on DIAGRAM Nos. 9 and 10, Layout Types 12A or 12B shown on Standard Plan A77F1 or Layout Type 12C shown on Standard Plan A77F2 are typically used.
- 2. Where double thrie beam barrier railing is constructed to shield the ends of structures for the conditions shown in RAILING CASE 9 on DIAGRAM No. 9, Type 25A Connection Loyout shown on Standard Plan A78H is typically used. For bridge railing connection details, see Standard Plans A78F1 and A78K.
- 3. Where single thrie beam barrier railing is constructed to shield the ends of structures for the conditions shown in RAILING CASE 10 on DIAGRAM No. 10, Type 25A Connection Layout shown on Standard Plan A78H is typically used. For bridge railing connection details, see Standard Plan A78J. Connection Detail 2A shown on Standard Plan A78F2 applies to the bridge railing connection.
- 4. Where single thrie beam barrier railing is constructed to shield opposing directions of traffic as shown in RALLING CASE 11 on D1AGRAM No. 10, Connection Detail 3A shown on Standard Plan A78F2 applies to the bridge railing connection.
- 5. See Standard Plan A77D1 for additional guard railing at structure placement diagrams.
- 6. These diagrams are not intended to provide geometric design standard guidance. See the Highway Design Manual for this type of guidance.

#### **LEGEND**

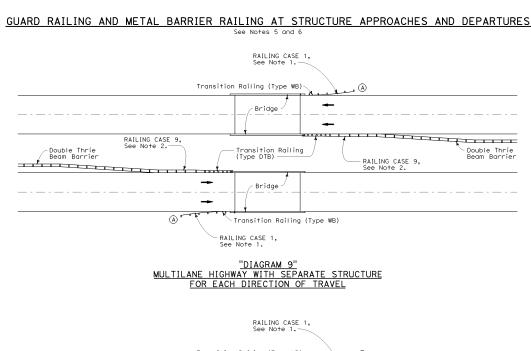
Caltrans approved end treatment or buried post end anchor.

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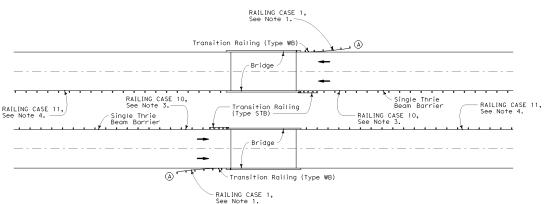
#### METAL BEAM GUARD RAILING AND THRIE BEAM BARRIER RAILING AT STRUCTURES (PLACEMENT DIAGRAMS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77D2



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"DIAGRAM 10" MULTILANE HIGHWAY WITH SEPARATE STRUCTURE FOR EACH DIRECTION OF TRAVEL



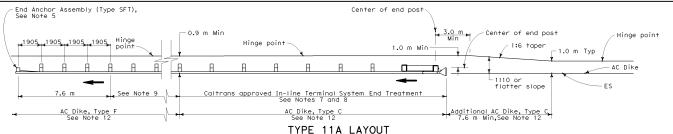




#### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR **EMBANKMENTS**

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A77E1

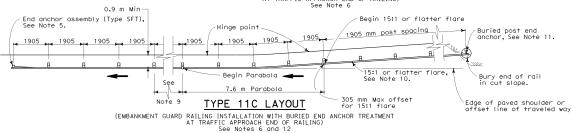


#### (EMBANKMENT GUARD INSTALLATION WITH IN-LINE END TREATMENT AT TRAFFIC APPROACH END OF RAILING) Center of end post End Anchor Assembly (Type SFT), See Note 6 1:6 taper 1.0 m Min 0.9 m Min Hinge point Hinge point Hinge point 1905 1905 1905 1905 1.0 m Typ I.→ Center of end post 1:10 or flatter slope FS See Note 9 Caltrans approved Flared Terminal System End Treatment See Note 8 1.32 m Typ

AC Dike, Type C See Note 12

#### TYPE 11B LAYOUT

(EMBANKMENT GUARD RAILING INSTALLATION WITH FLARED END TREATMENT AT TRAFFIC APPROACH END OF RAILING)



#### NOTES

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- 1. Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1, and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as
- 3. Except as noted, line posts are 150 mm × 200 mm × 1.83 m wood with 150 mm × 200 mm × 360 mm wood blocks. MW 150 × 14 steel posts, 1.83 m in length, with 150 mm × 200 mm × 360 mm notched wood blocks or plastic blocks may be used for 150 mm × 200 mm × 1.83 m wood post with 150 mm x 200 mm x 360 mm wood blocks where applicable and when
- 4. Direction of adjacent traffic indicated by ---- .

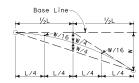
AC Dike, Type F See Note 12

- 5. For End Anchor Assembly (Type SFT) details, see Standard Plan A77H1.
- 6. Layout Types 11A, 11B or 11C are typically used where guard railing is recommended to shield embankment slopes and a crashworthy end treatment is required for only one direction of traffic. See Railing Case 5 in Diagram Nos. 5, 6, 7 and 8 on Standard Plan A77D1.

7. In-line Terminal System End Treatments are used where site conditions will not accommodate a flared end treatment.

Additional AC Dike, Type C 7.6 m Min, See Note 12

- 8. The type of terminal system end treatment to be used will be shown on the Project Plans.
- Dependent on site conditions (embankment height and side slope), construction
  of additional guard railing (length equal to multiples of 3.8 m with 1.9 m post
  spacing) may be advisable.
- 10. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of guard railing within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 3.8 meters.
- 11. For details of the buried post end anchor used with Type 11C Layout, see Standard Plan A7712.
- 12. Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.



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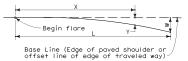
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July 1, 2004

#### TYPICAL PARABOLIC LAYOUT

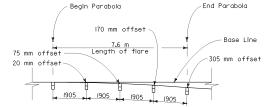


WX<sup>2</sup> L2

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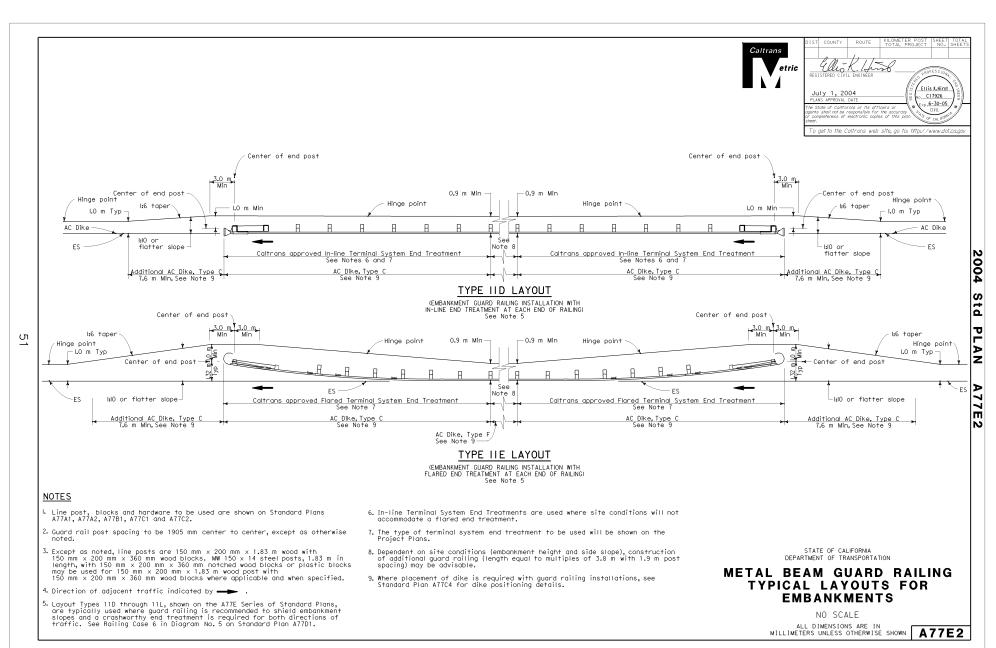
Y = Offset from base line W = Maximum offset X = Distance along base line L = Length of flare

### PARABOLIC FLARE OFFSETS



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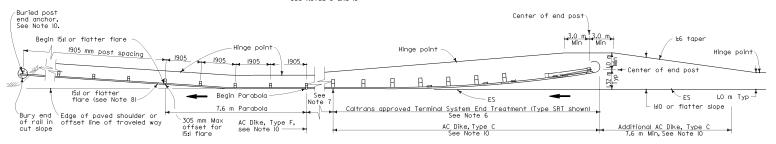
NO SCALE





Buried post end anchor, See Note 9. -0.9 m Min -Begin I5:1 or flatter flare Begin 15:1 or flatter flare - Hinge point 1905 mm post spacing Hinge point 1905 mm post spacing Buried post 1905 1905 1905 1905 end anchor. 1905 1905 1905 See Note 9. 15:1 or flatter (see Note 8) 15:1 or flatter Begin Parabola Begin Parabola Bury end of flare (see Note 8) Note rail in cut 7.6 m Parabola See Note 11 7.6 m Parabola slope. `Bury end `Edge of paved shoulder or of rail in offset line of traveled way See Note 11 305 mm Max 305 mm Max offset for 15:1 flare Edge of paved shoulder or offset line of traveled way offset for cut slope 15:1 flare TYPE IIF LAYOUT

(EMBANKMENT GUARD RAILING INSTALLATION WITH A BURIED END ANCHOR TREATMENT AT EACH END OF RAILING)
See Notes 5 and 10



#### TYPE IIG LAYOUT

(EMBANKMENT GUARD RAILING INSTALLATION WITH FLARED END TREATMENT AND A BURIED END ANCHOR TREATMENT AT THE ENDS OF RAILING) See Notes 5 and 10

#### NOTES

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- Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as otherwise
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm nothed wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 m wood post with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4. Direction of adjacent traffic indicated by 🕳 .
- 5. Layout Types 11D through 11L, shown on the A77E Series of Standard Plans, are typically used where guard railing is recommended to shield embankment slopes and a crashworthy end treatment is required for both directions of traffic. See Railing Case 6 in Diagram No. 5 on Standard Plan A77D1

- 6. The type of terminal system end treatment to be used will be shown on the Project Plans.
- 7. Dependent on site conditions (embankment height and side slope), construction of additional guard railing (length equal to multiples of 3.8 m with 1.9 m post spacing) may be advisable.
- 8. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of guard railing within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 3.8 meters.
- 9. For details of the buried post end anchor used with Type 11F and 11G Layouts,
- 10. Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.
- II. For typical flare offsets for 7.6 m length parabola with maximum offset of 305 mm, see Standard Plan A77E1.

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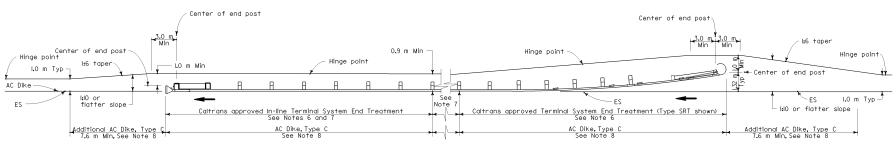
#### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR **EMBANKMENTS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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#### TYPE IIH LAYOUT

(EMBANKMENT GUARD RAILING INSTALLATION WITH FLARED END TREATMENT AND AN IN-LINE TREATMENT AT THE ENDS OF RAILING) See Notes 5 and 8

#### **NOTES**

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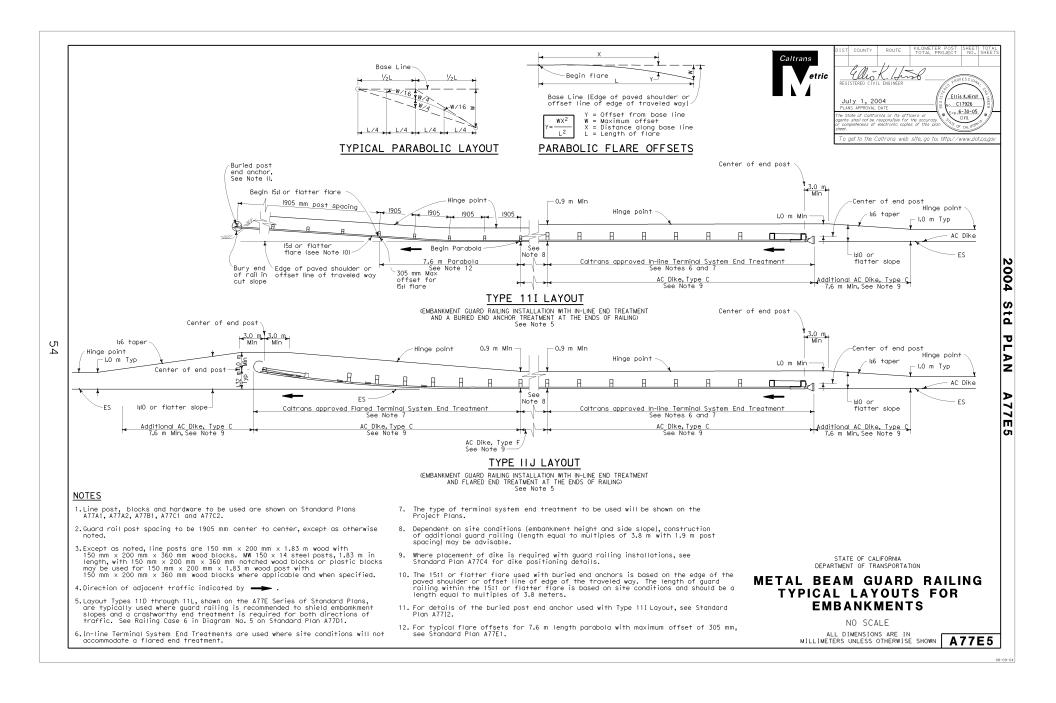
- Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as otherwise
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm notched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 m wood post with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4. Direction of adjacent traffic indicated by  $\longrightarrow$  .

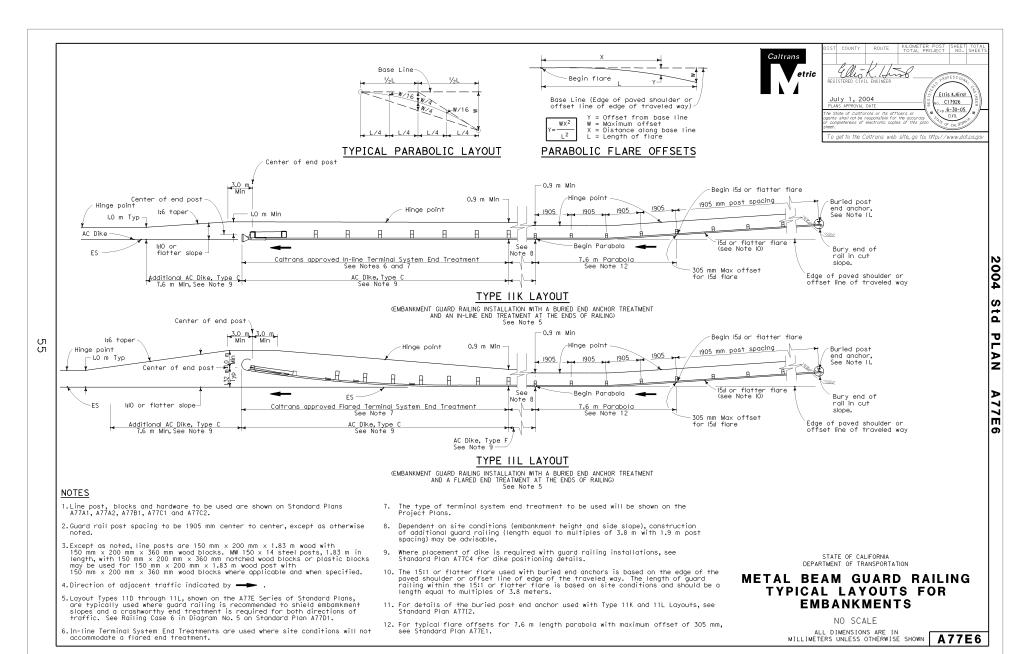
- 5. Layout Types 11D through 11L, shown on the A77E Series of Standard Plans, are typically used where guard railing is recommended to shield embankment slopes and a croshworthy end treatment is required for both directions of traffic. See Railing Case 6 in Diagram No. 5 on Standard Plan A77D1
- 6. The type of terminal system end treatment to be used will be shown on the Project Plans.
- Dependent on site conditions (embankment height and side slope), construction
  of additional guard railing (length equal to multiples of 3.8 m with 1.9 m post
  spacing) may be advisable.
- Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.

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#### **METAL BEAM GUARD RAILING** TYPICAL LAYOUTS FOR **EMBANKMENTS**

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Center of end post Center of end post Hinge point -0.9 m Min Wall or 953,953,953,953,953,953,1905 Hinge point bridge rail l:6 taper LO m Min ⊢I.0 m Typ - AC Dike 1:10 or flatter slope FS 7.6 m Transition Railing See Note 8 (Type WB), See Note 5 Caltrans approved In-line Terminal System End Treatment See Notes 6 and 7 FTW AC Dike, Type F See Note 9 AC Dike, Type C See Note 9 Additional AC Dike, Type C.
7.6 m Min, See Note 9 TYPE I2A LAYOUT (GUARD RAILING INSTALLATION AT STRUCTURE APPROACH WITH AN IN-LINE END TREATMENT AT TRAFFIC APPROACH END OF RAILING) See Notes 12 and 13.

See Notes 10 3.0 m 3.0 m Min Min 1:6 taper -0.9 m Min Hinge point Center of end post Hinge point Wall or Hinge point-953,953,953,953,953, 1905 I.O m Typ bridge rail Center of end post FS 1:10 or flatter slope 7.6 m Transition Railing See Note 8 (Type WB), See Note 5 Caltrans approved Flared Terminal System End Treatment See Note 7 AC Dike, Type F AC Dike, Type C See Note 9 Additional AC Dike, Type C 7.6 m Min, See Note 9

#### TYPE I2B LAYOUT

(GUARD RAILING INSTALLATION AT STRUCTURE APPROACH WITH A FLARED END TREATMENT AT TRAFFIC APPROACH END OF RAILING)
See Notes 10

#### NOTES

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- I. Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- Guard rail post spacing to be 1905 mm center to center, except a otherwise noted.
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm nortched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 wood posts with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.

See Notes 12 and 13.

- 4. Direction of adjacent traffic indicated by -----
- For Transition Railing (Type WB) details for Types 12A and 12B Layouts, see Standard Plan A77J4.
- 6. In-line Terminal System End Treatments are used where site conditions will not accommodate a flared end treatment.
- 7. The type of terminal system end treatment to be used will be shown on the Project Plans.
- Dependent on site conditions (embankment height, side slopes, or other fixed objects), it may be advisable to construct additional guard railing (a length equal to multiples of 3.8 m with 1.9 m post spacing) between the transition railing and end treatment.

- 9. Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.
- 10. Type 12A or Type 12B Layouts are typically used:
  - a. To the right of approaching traffic, at the end of a structure, on two-lane conventional highway where the roadbed width across the structure is less than 12 meters. See Railing Case 1 in Diagram No. 1 on Standard Plan A7701.
  - b. To the left of approaching traffic, at the end of a structure, on two-lane conventional highway where the roadbed width across the structure is less than 12 meters. See Railing Case 2 in Diagram No. 1 on Standard Plan A7701.
  - c. To the right of approaching traffic at the end of each structure on multilane freeways or expressways with separate adjacent or parallel bridges. See Railing Case 1 in Diagram No. 3 on Standard Plan A77D1.
  - d. To the right of approaching traffic at the end of the structure on multilane freeways or expressways with decked median on the bridge. See Railing Case 1 in Diagram No. 4 on Standard Plan ATTD1.
- II. See Standard Plan A77F3 for typical layout used left of approaching traffic at the ends of each structure on multilane freeways or expressways with separate adjacent or parallel bridges. See RAILING CASE 4 in Diagrams No. 3 on Standard Plan A77D1.

- 12. For additional details of typical connections to bridge rail, see Connection Detail AA on Standard Plans A77J1 and A77J2 and Connection Detail FF on Standard Plans A77K1 and A77K2.
- For additional details of a typical connection to walls or abutments, see Standard Plan A77J3.

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#### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR STRUCTURE APPROACH

NO SCALE

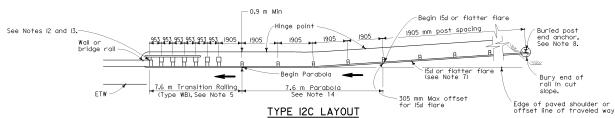
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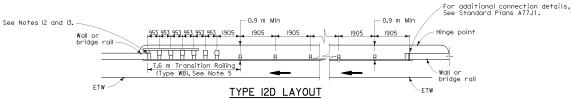
TYPICAL LAYOUTS FOR STRUCTURE APPROACH AND BETWEEN STRUCTURES

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77F2



(GUARD RAILING INSTALLATION AT STRUCTURE APPROACH WITH A BURIED END ANCHOR TREATMENT AT TRAFFIC APPROACH END OF RAILING) See Notes 9 and 10



(CONTINUOUS GUARD RAILING INSTALLATION BETWEEN STRUCTURES) See Notes 6 and 10

#### NOTES

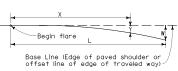
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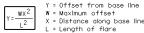
- I. Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as otherwise
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm notched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 wood posts with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4. Direction of adjacent traffic indicated by  $\longrightarrow$  .
- 5. For Transition Railing (Type WB) details for Types 12C and 12D Layouts, see Standard Plan A77J4.
- 6. Type 12D layout is typically used where continous guard railing is recommended between structures.
- 7. The 15:1 or flatter flare for Type 12C Layout is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of guard railing with the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 3.8 meters.
- 8. For details of the buried post end anchor used with Type 12C Layout, see
- Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.

- 10. Type 12C Layout is typically used:
  - a. To the right of approaching traffic, at the end of the structure, on two-lane conventional highway where the roadbed width across the structure is less than 12 meters. See Railing Cose 1 in Diagram No. 1 on Standard Plan A7701.
  - b. To the left of approaching traffic, at each of a structure, on two-lane conventional highway where the roadbed width across the structure is less than12 meters. See Railing Case 2 in Diagram No. 1 on Standard Plan A77D1.
  - c. To the right of approaching traffic at the end of each structure on multilane freeways or expressways with separate adjacent or parallel bridges. See Railing Case 1 in Diagram No. 3 on New Standard Plan A77D1.
  - d. To the right of approaching traffic at the end of the structure on multilane freeways or expressways with decked median on the bridge. See Railing Case 1 in Diagram No. 4 on Standard Plan A7701.
- 11. See Standard Plan A77F3 for typical layout used left of approaching traffic at the ends of each structure on multilane freeways or expressways with separate adjacent or parallel bridges. See RAILING CASE 4 in Diagram No. 3 on Standard Plan A77D1.
- 12.For additional details of typical connections to bridge rail, see Connection Detail AA on Standard Plans A77Xl and A77X2 and Connection Detail FF on Standard Plans A77Kl and A77K2.
- 13. For additional details of a typical connection to walls or abutments, see Standard Plan A77J3.
- 14.For typical flare offsets for 7.6 m length parabola with maximum offset of 305 mm, see Standard Plan A77E1.

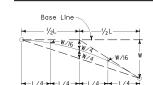
Caltrans

Ellio K. I from Ellis K.Hirst C17926 6-30-05 CIVIL To get to the Caltrans web site, go to: http://www.dot.ca.go



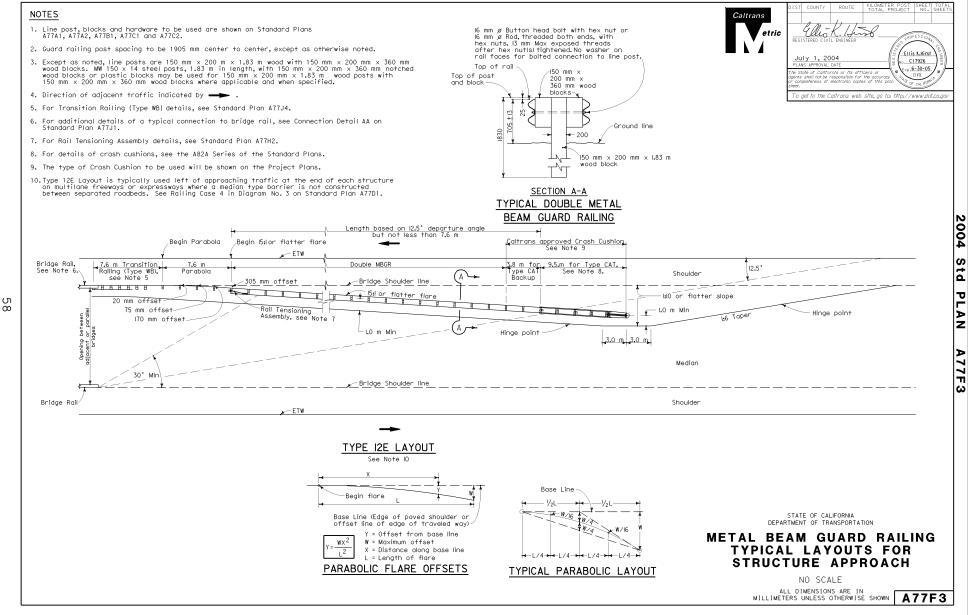


# PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT

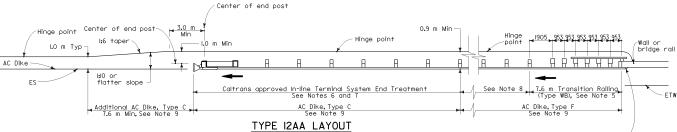
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION





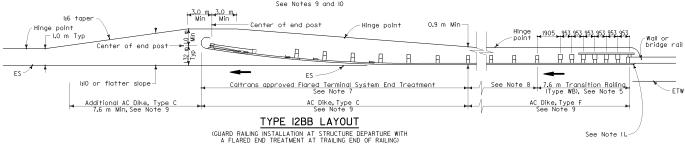
See Note II.





(GUARD RAILING INSTALLATION AT STRUCTURE DEPARTURE WITH AN IN-LINE END TREATMENT AT TRAILING END OF RAILING)

See Notes 9 and 10



#### NOTES

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- Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as otherwise
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm notched wood blocks or plastic blocks may be used for 155 mm  $\times$  200 mm  $\times$  1.83 wood posts with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4. Direction of adjacent traffic indicated by  $\longrightarrow$  .
- 5. For Transition Railing (Type WB) details for Types 12AA and 12BB Layouts, see Standard Plan A77J4.
- In-line Terminal System Treatments are used where site conditions will not accommodate a flared end treatment.
- 7. The type of terminal system to be used will be shown on the Project Plans.

- 8. Dependent on site conditions (embankment height, side slopes, other fixed objects), it may be advisable to construct additional guard railing (a length equal to multiples of 3.8 m with 1.9 m post spacing) between the transition railing and end treatments.
- Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.
- 10. Type 12AA or Type 12BB Layouts are typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is less than 12 meters. See Railing Case 2 in Diagram No. 1 on Standard
- 11. For additional details of typical connections to bridge rail, see Connection Detail BB on Standard Plans A77J, Connection Detail CC on Standard Plans A77J2, Connection Detail Go on Standard Plans A77K1 and Connection Detail HH on Standard Plans A77K2.

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# METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE

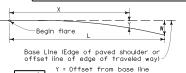
NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN A77F4

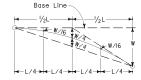
ROUTE KILOMETER POST TOTAL PROJECT

COUNTY

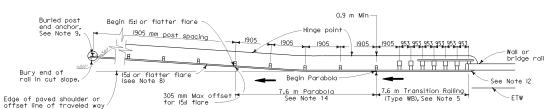
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#### W = Maximum offset X = Distance along base line L2 L = Length of flare PARABOLIC FLARE OFFSETS

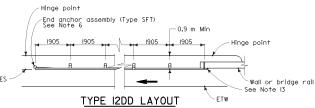


TYPICAL PARABOLIC LAYOUT



#### TYPE I2CC LAYOUT

(GUARD RAILING INSTALLATION AT STRUCTURE DEPARTURE WITH A BURIED END ANCHOR TREATMENT AT TRAILING END OF RAILING) See Notes 10 and 11



(GUARD RAILING INSTALLATION AT STRUCTURE DEPARTURE WITH END ANCHOR ASSEMBLY AT TRAILING END OF RAILING) See Notes 7 and 10

#### NOTES

- Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard rail post spacing to be 1905 mm center to center, except as otherwise noted.
- 3. Except as noted, line posts are 150 mm × 200 mm × 1.83 m wood with 150 mm × 200 mm × 360 mm wood blocks. MW 150 × 14 steel posts, 1.83 m in length, with 150 mm × 200 mm × 360 mm notched wood blocks or plastic blocks may be used for 150 mm × 200 mm × 1.83 wood posts with 150 mm × 200 mm × 360 mm wood blocks where applicable and when specified
- 4. Direction of adjacent traffic indicated by ----
- 5. For Transition Railing (Type WB) details for Type 12C Layout, see Standard Plan A77J4.
- 6. For details of End Anchor Assembly (Type SFT) used with Type 12DD Layout, see Standard Plan A77H1.
- 7. Type 12DD layout is typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is equal to or greater than 12 meters and guard railing is recommended (embankment height, side slopes, other fixed objects). See Railing Case 3 in Diagram No. 2 on Standard Plan A7701. Length of railing to be equal to multiples of 3.8 meters. For guard railing connection details to bridge rail, see Standard Plans A77J1 and A77K1. For guard railing connection details to wall, see Standard Plan A77J3.

- 8. The 15:1 or flatter flare for Type 12CC Layout is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of guard railing within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 3.8 meters.
- 9. For details of the buried post end anchor used with Type 12CC Layout, see Standard Plan A7712.
- 10. Where placement of dike is required with guard railing installations, see Standard Plan A77C4 for dike positioning details.
- 11. Type 12CC Layout is typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is less than 12 meters. See Railing Case 2 in Diagram No. 1 on Standard Plan ATD1.
- For additional details of a typical connection to bridge rail for Layout Type 12CC, see Connection Detail CC on Standard Plan A77J2 and Connection Detail HH
- 13. For additional details of a typical connection to bridge rail for Layout Type 12DD, see Connection Detail BB on Standard Plan A77J1 and Connection Detail GG on Standard Plan A77K1.
- 14. For typical flare offsets for 7.6 m length parabola with maximum offset of 305 mm, see Standard Plan A77E1.

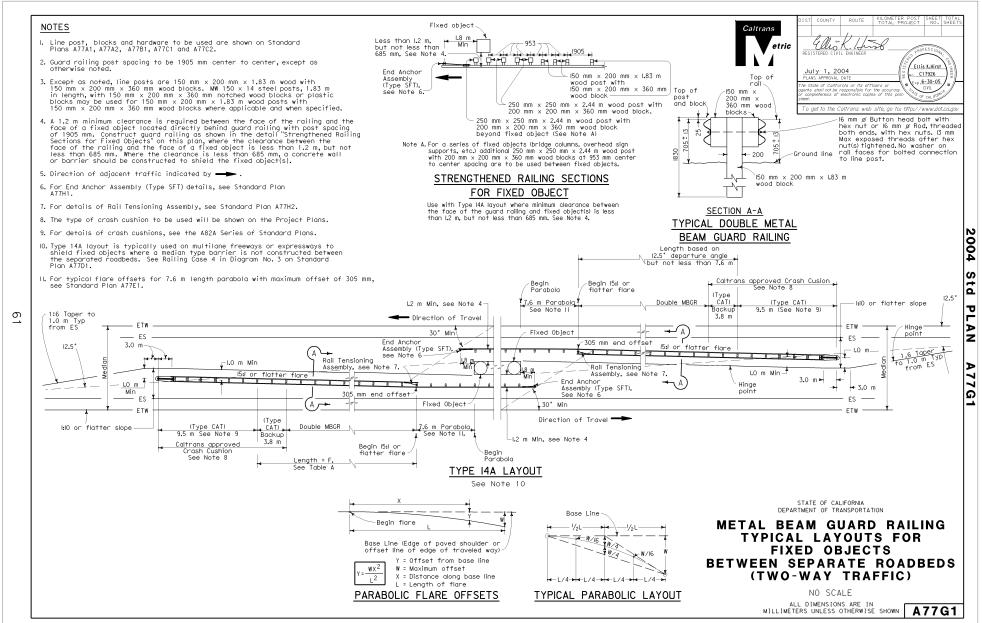
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### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77F5

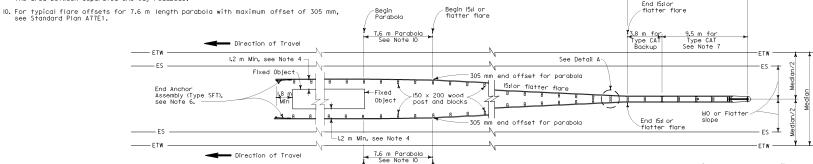
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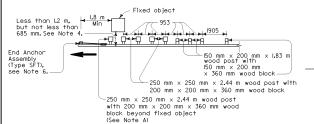
ROUTE KILOMETER POST TOTAL PROJECT

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- Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard railing post spacing to be 1905 mm center to center, except as otherwise noted.
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 m notched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 m wood posts with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4. A 1.2 m minimum clearance is required between the face of the railing and the face of a fixed object located directly behind guard railing with post spacing of 1905 mm. Construct guard railing as shown in the detail "Strengthened Railing Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 1.2 m, but not less than 685 mm. Where the clearance is less than 685 mm, a concrete wall or barrier should be constructed to shield the fixed object(s).
- 5. Direction of adjacent traffic indicated by ---
- 6. For End Anchor Assembly (Type SFT) details, see Standard Plan A77H1.
- 7. For details of crash cushions, see the A82A Series of Standard Plan.
- 8. Type of crash cushion to be used will be shown on the Project Plans.
- 9. Type 15A layout is typically used on multilane freeways or expressways to shield fixed objects in the area between separated one-way roadbeds.



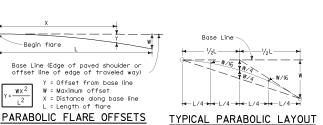
Begin Parabola



Note A. For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 250 mm × 250 mm × 2,44 m wood post with 200 mm × 200 mm × 360 mm wood blocks at 953 mm center to center spacing are to be used between fixed objects.

# STRENGTHENED RAILING SECTIONS FOR FIXED OBJECT

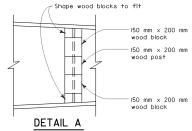
Use with Type ISA layout where minimum clearance between the face of the guard railing and the fixed object(s) is less than I.2 m, but not less than 685 mm. See Note 4.



Begin 15:1 or flatter flare

TYPE ISA LAYOUT

See Note 9



Caltrans

Caltrans approved Crash Cushion See Note 8

> STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR FIXED OBJECTS BETWEEN SEPARATE ROADBEDS (ONE-WAY TRAFFIC)

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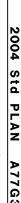
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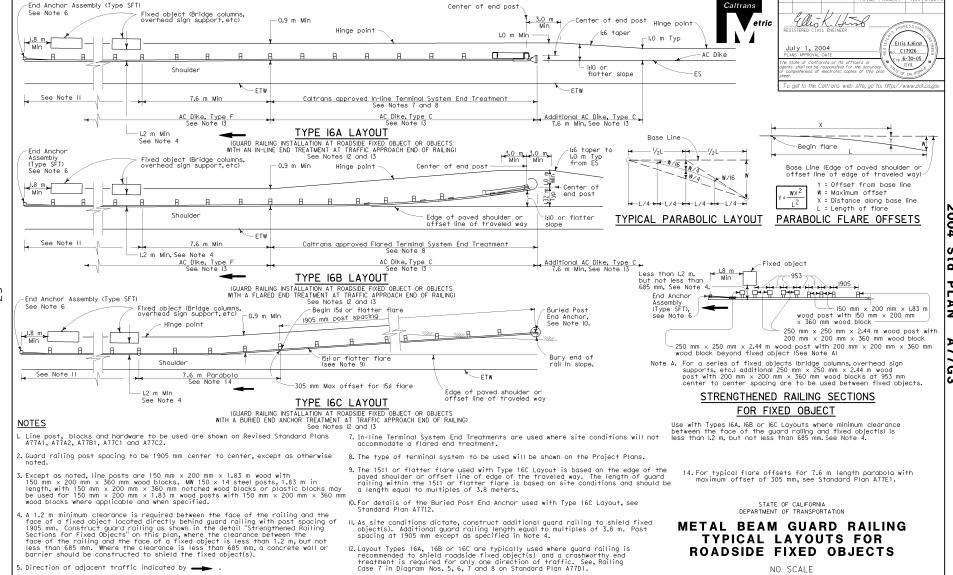
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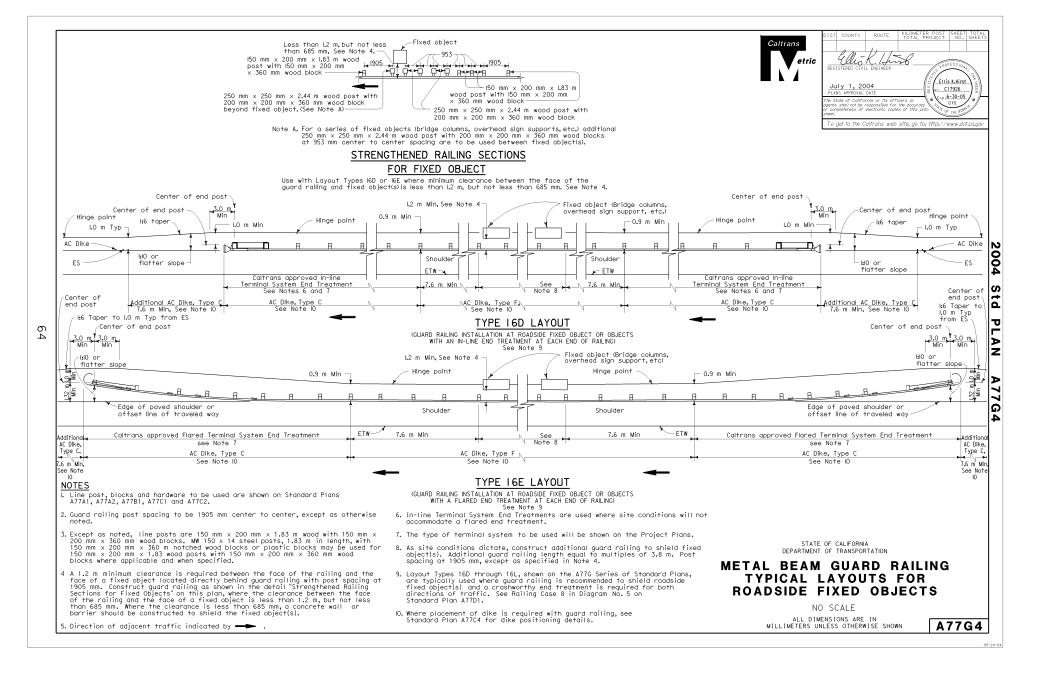
I3. Where placement of dike is required with guard railing, see Standard Plan A77C4 for dike positioning details.

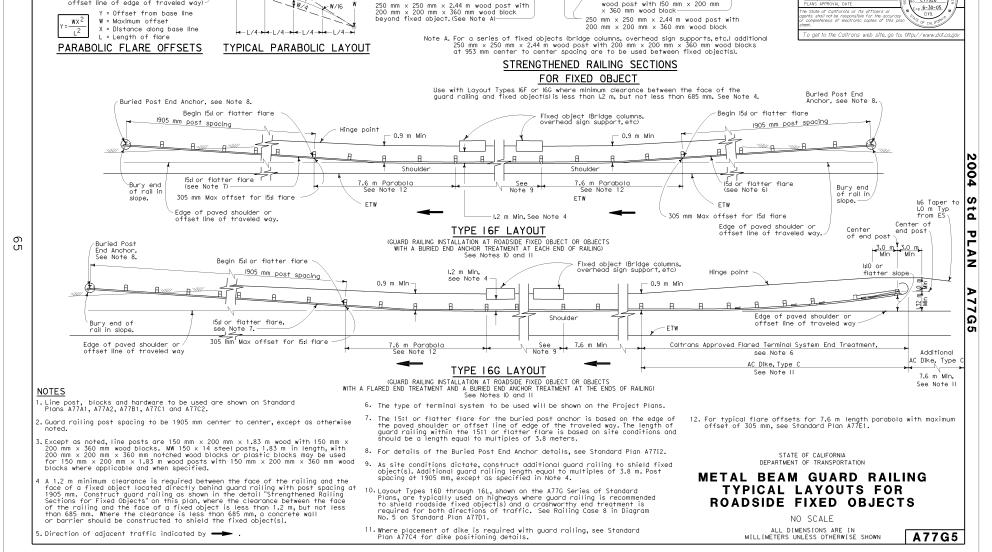
6. For End Anchor Assembly (Type SFT) details, see Revised Standard Plan RSP A77H1.

A77G3

ALL DIMENSIONS ARE IN

MILLIMETERS UNLESS OTHERWISE SHOWN





Less than 1.2 m, but not less than 685 mm, See Note 4.

1905

150 mm × 200 mm × 1.83 m wood

post with I50 mm × 200 mm × 360 mm wood block

Base Line

Begin flare

Base Line (Edge of paved shoulder or offset line of edge of traveled way)

Fixed object

953 ~

wood post with 150 mm × 200 mm × 1.83 m

Caltrans

Ellio K. I from

Ellis K.Hirst

C17926

Less than 1.2 m, but not less than 685 mm, See Note 4.-953 ~ 150 mm  $\times$  200 mm  $\times$  1.83 m wood post with 150 mm  $\times$  200 mm  $\frac{1905}{}$ x 360 mm wood block 150 mm × 200 mm × 1.83 m wood post with 150 mm × 200 mm 250 mm  $\times$  250 mm  $\times$  2.44 m wood post with 200 mm  $\times$  200 mm  $\times$  360 mm wood block × 360 mm wood blockbeyond fixed object. (See Note A)-250 mm  $\times$  250 mm  $\times$  2.44 m wood post with 200 mm x 200 mm x 360 mm wood block

ROUTE KILOMETER POST TOTAL PROJECT Ellis K. Lorso Ellis K.Hirst July 1, 2004 C17926 p\_6-30-05 he State of California or its officers or CIVIL

get to the Caltrans web site, go to: http://www.dot.ca.gi

Center of end post

Caltrans

Note A. For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 250 mm × 250 mm × 2.44 m wood post with 200 mm × 200 mm × 360 mm wood blocks at 953 mm center to center spacing are to be used between fixed object(s).

# STRENGTHENED RAILING SECTIONS

#### FOR FIXED OBJECT

Use with Layout Type I6H where minimum clearance between the face of the guard railing and fixed object(s) is less than I.2 m, but not less than 685 mm. See Note 4.

1:6 Taper to 1.0 m Typ from ES 004 Center of end post 3.0 m Y Center of end post S I.2 m Min. See Note 4-Fixed object (Bridge columns, Center of end post overhead sign support, etc.) flatter slope 0.9 m Min Hinge point Hinge point ı٩ 0.9 m Min I.O m Min I.O m Typ ┰ Edge of payed shoulder or 1:10 or ⊳ Shoulder Shoulder flatter slope offset line of traveled way z ETW-Caltrans approved in-line - ETW Terminal System End Treatment See Notes 6 and 7 7.6 m Min Caltrans approved Flared Terminal System End Treatment .7.6 m Min N Addition see Note 7 AC Dike, Type C, ъ Additional AC Dike, Type 7.6 m Min, See Note 10 AC Dike, Type C See Note 10 AC Dike, Type F. See Note 10 AC Dike, Type C See Note 10 7.6 m Min. See Note Ω 10

# TYPE 16H LAYOUT

(GUARD RAILING INSTALLATION AT ROADSIDE FIXED OBJECT OR OBJECTS WITH A FLARED END TREATMENT AND AN IN-LINE TREATMENT AT THE ENDS OF RAILING) See Note 9

#### <u>NOTES</u>

Hinge point

AC Dike

ES

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- I. Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.
- 2. Guard railing post spacing to be 1905 mm center to center, except as otherwise
- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 mm notched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 m wood posts with  $150~\text{mm} \times 200~\text{mm} \times 360~\text{mm}$  wood blocks where applicable and when specified.
- 4 A 1.2 m minimum clearance is required between the face of the railing and the face of a fixed object located directly behind guard railing with post spacing at 1905 mm. Construct guard railing as shown in the detail "Strengthened Railing Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 1.2 m, but not less than 685 mm. Where the clearance is less than 685 mm, a concrete wall or barrier should be constructed to shield the fixed object(s).
- Direction of adjacent traffic indicated by

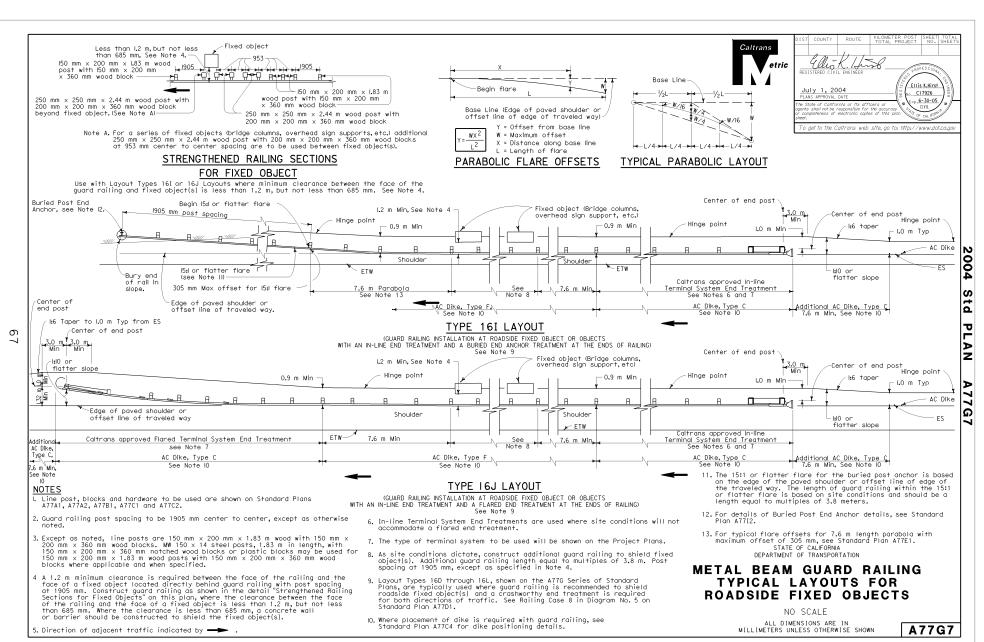
- 6. In-line Terminal System End Treatments are used where site conditions will not accommodate a flared end treatment.
- 7. The type of terminal system to be used will be shown on the Project Plans.
- As site conditions dictate, construct additional guard railing to shield fixed object(s). Additional guard railing length equal to multiples of 3.8 m. Post spacing at 1905 mm, except as specified
- Layout Types 16D through 16L, shown on the A776 Series of Standard Plans, typically used where guard railing is recommended to shield roadside fixed object(s) and a crashworthy end treatment is required for both directions of traffic. See Railing Case 8 in Diagram No. 5 on Standard Plan A77D1.
- 10. Where placement of dike is required with guard railing, see Standard Plan A77C4 for dike positioning details.

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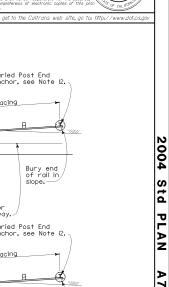
### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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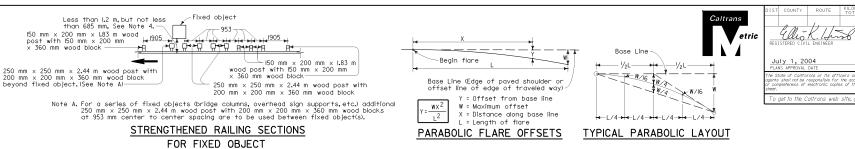
ROUTE KILOMETER POST TOTAL PROJECT

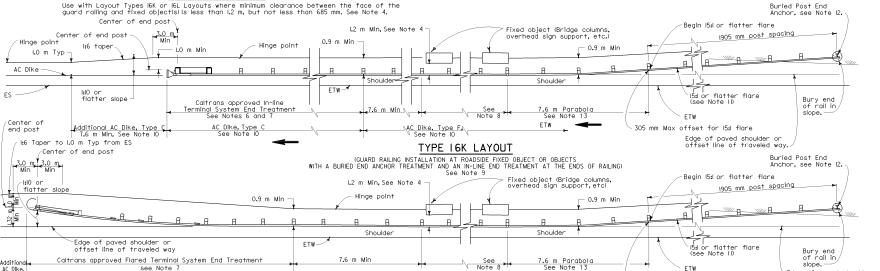
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CIVIL





7.6 m Min, See Note NOTES

AC Dike,

Type C,

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I. Line post, blocks and hardware to be used are shown on Standard Plans A77A1, A77A2, A77B1, A77C1 and A77C2.

2. Guard railing post spacing to be 1905 mm center to center, except as otherwise

see Note 7

AC Dike, Type C

- 3. Except as noted, line posts are 150 mm  $\times$  200 mm  $\times$  1.83 m wood with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks. MW 150  $\times$  14 steel posts, 1.83 m in length, with 150 mm  $\times$  200 mm  $\times$  360 m notched wood blocks or plastic blocks may be used for 150 mm  $\times$  200 mm  $\times$  1.83 wood posts with 150 mm  $\times$  200 mm  $\times$  360 mm wood blocks where applicable and when specified.
- 4 A 1.2 m minimum clearance is required between the face of the railing and the A 1.2 m minimum clearance is required between the face of a fixed object located directly behind guard railing with post spacing at 1905 mm. Construct guard railing as shown in the detail "Strengthened Railing Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 1.2 m, but not less than 685 mm. Where the clearance is less than 685 mm. Where the clearance is less than 685 mm. or concrete wall or barrier should be constructed to shield the fixed object(s).
- 5. Direction of adjacent traffic indicated by 🖚

TYPE I6L LAYOUT

AC Dike, Type F N

See Note 10

(GUARD RAILING INSTALLATION AT ROADSIDE FIXED OBJECT OR OBJECTS
WITH A BURIED END ANCHOR TREATMENT AND A FLARED END TREATMENT AT THE ENDS OF RAILING)

6. In-line Terminal System End Treatments are used where site conditions will not accommodate a flared end treatment.

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- 7. The type of terminal system to be used will be shown on the Project Plans.
- 8. As site conditions dictate, construct additional guard railing to shield fixed object(s). Additional guard railing length equal to multiples of 3.8 m. Post spacing at 1905 mm, except as specified in Note 4.
- Layout Types 16D through 16L, shown on the A77G Series of Standard Plans, are typically used where guard railing is recommended to shield roadside fixed object(s) and a crashworthy end treatment is required for both directions of traffic. See Railing Case 8 in Diagram No. 5 on Standard Plan A77D1.
- IO. Where placement of dike is required with guard railing, see Standard Plan A77C4 for dike positioning details.

11. The 15:1 or flatter flare for the buried post anchor is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of guard railing within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 3.8 meters.

Edge of paved shoulder or

offset line of traveled way.

- 12. For details of Buried Post End Anchor details, see Standard Plan A7712.
- 13. For typical flare offsets for 7.6 m length parabola with maximum offset of 305 mm, see Standard Plan A77E1. STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

FTW

305 mm Max offset for I5:1 flare

### METAL BEAM GUARD RAILING TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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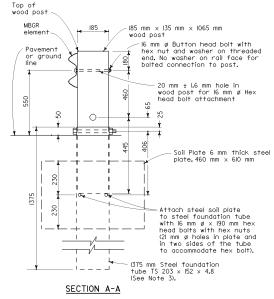


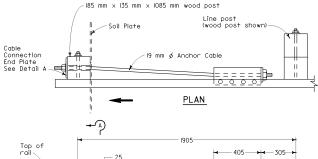


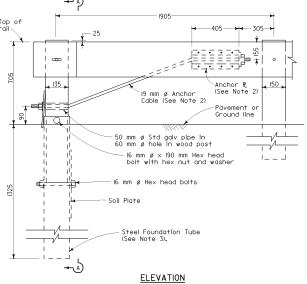
PL 200 mm x 200 mm x 16 mm Φ

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# DETAIL A **CABLE CONNECTION** END PLATE







END ANCHOR

ASSEMBLY (TYPE SFT) See Note I

#### **NOTES**

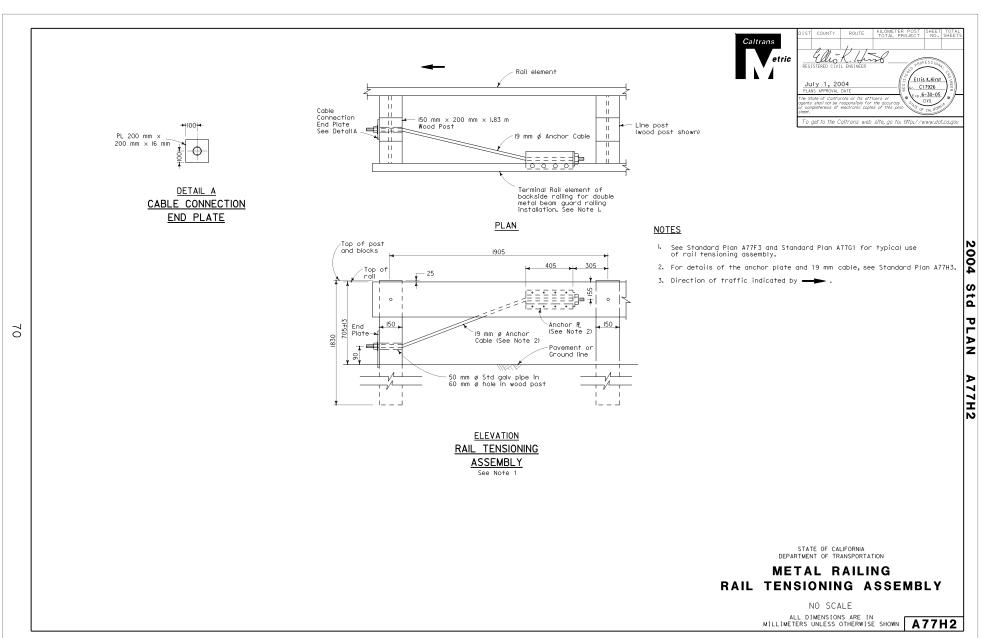
- See the A77E, A77F and A77G series of Standard Plans for typical use of End Anchor Assembly (Type SFT).
- 2. For details of the anchor plate and 19 mm cable, see Standard Plan A77H3.
- 3. A 1830 mm length steel foundation tube, TS 203  $\times$  152  $\times$  4.8, without a soil plate, may be furnished and installed in place of the 1375 mm length steel foundation tube and soil plote shown. Minimum embedment of the 1830 mm length tube shall be 1760 mm. A 16 mm ø hex head bolt and nut shall be installed in the hole in the 1830 mm length tube to keep the wood post from dropping into the tube.
- 4. Direction of traffic indicated by -----

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# METAL RAILING **END ANCHOR ASSEMBLY** (TYPE SFT)

NO SCALE

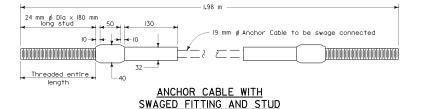
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77H1



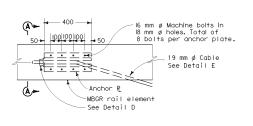


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See Standard Plan A77H1 and Standard Plan A77H2 for typical use of anchor cable and anchor plate.

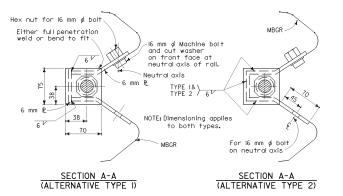


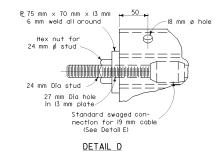
DETAIL E



#### ANCHOR PLATE DETAIL (MBGR shown, TBB similar)

71



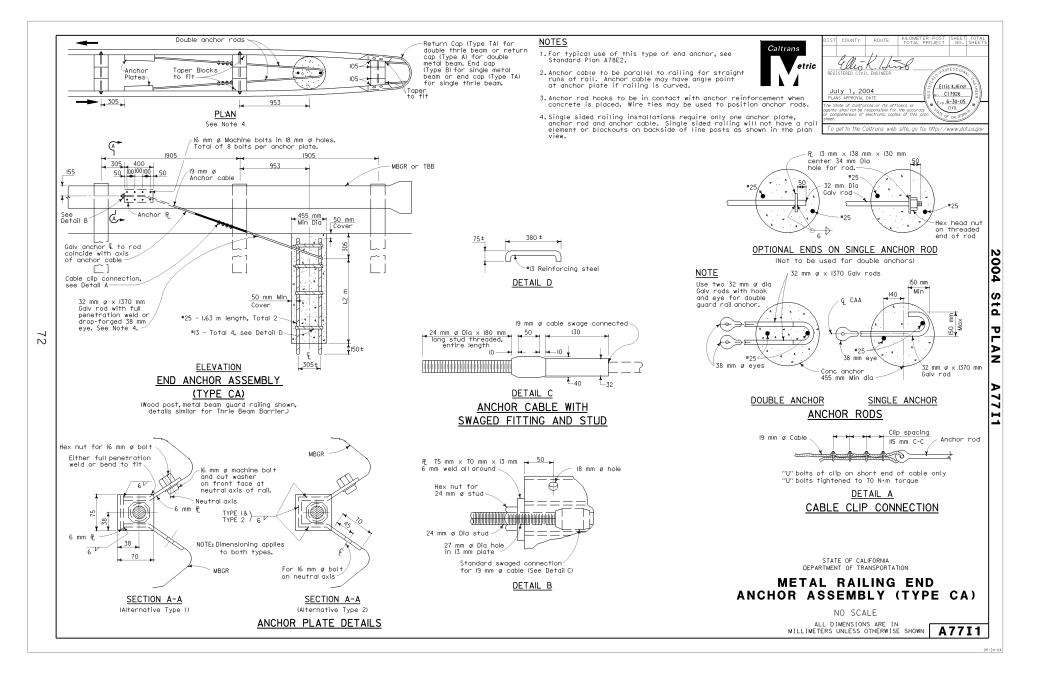


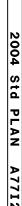
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# METAL RAILING **ANCHOR CABLE AND ANCHOR PLATE DETAILS**

NO SCALE

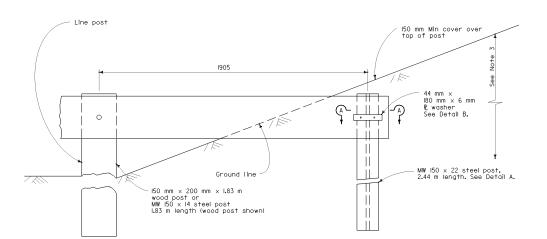
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77H3











M24 HS bolt 50 mm length with hex nut and cut washer MW I50 x 22 steel post. See Detail A.

#### SECTION A-A

MW I50 x 22 steel post, 2.44 m length 32 mm Dia 180 40,40,50 Rail element 6 mm /2 --≥32 mm Dia Holes DETAIL B DETAIL A

# BURIED POST END ANCHOR

See Note 3

#### **NOTES**

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- For typical use of this type of end anchor, with guard railing, see the A77E, A77F and A77G Series of the Standard Plans.
- Holes excavation in the slope to construct the buried post end anchor shall be backfilled with selected earth, placed in layers approximately 0.3 meters thick. Each layer shall be moistened and thoroughly compacted.
- The buried post end anchor shall only be constructed at those locations where the slope perpendicular to the roadway is non-traversable.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

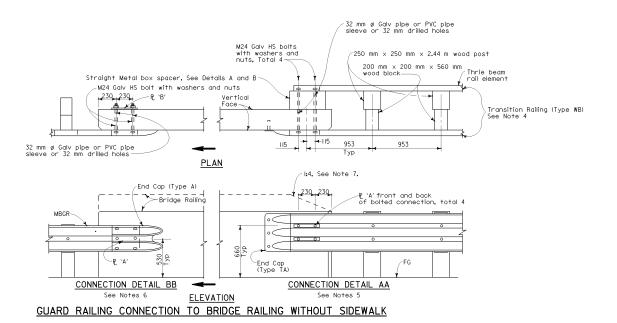
# METAL BEAM GUARD RAILING **BURIED POST END ANCHOR**

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN A7712

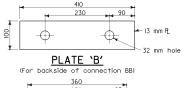
#### NOTES

- 1. See Standard Plan A77J2 for additional connection details to bridges without sidewalks.
- Additional details of posts, blocks and hardware are shown on Standard Plan A77B1, A77C1 and A77C2.
- 3. Direction of adjacent traffic indicated by  $\longrightarrow$  .
- 4. For additional details of Transition Railing (Type WB), see Standard Plan A77J4. Transition Railing (Type WB) transitions the 12 gage w-beam standard railing section of guard railing to a heavier gage nested thrie beam railing section which is connected to the concrete bridge railing.
- For typical use of Connection Detail AA, see Layout Types 12A and 12B on Standard Plan A77F1, Layout Types 12C and 12D on Standard Plan A77F2, and Layout Type 12E on Standard Plan A7F3.
- 6. For typical use of Connection Detail BB, see Layout Type 12D (structure departure railing connection) on Standard Plan A77F2 and Layout Type 12DD on Standard Plan A77F5.
- 7. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 25 mm at Connection Detail AA, toper the top of the end of the bridge railing at 1:4 to match the top elevation of the thrie beam rail.

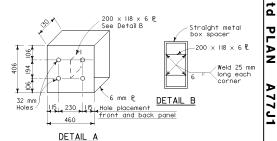




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350 230 65 6 mm R



STRAIGHT METAL BOX SPACER

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

METAL BEAM GUARD RAILING
CONNECTIONS TO
BRIDGE RAILINGS
WITHOUT SIDEWALKS
DETAILS No. 1

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A77J1

2004

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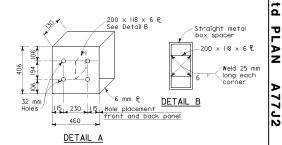
32 mm hole

004

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Caltrans

PLATE 'A'



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRAIGHT METAL BOX SPACER

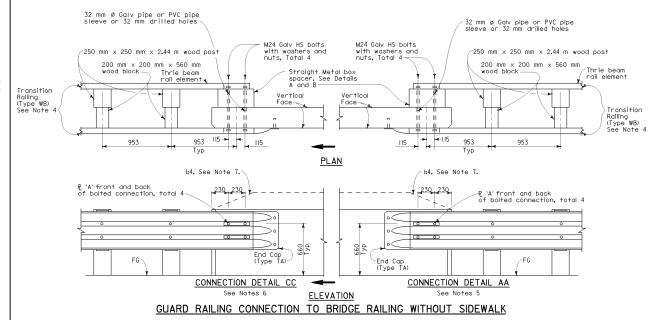
METAL BEAM GUARD RAILING **CONNECTIONS TO BRIDGE RAILINGS** WITHOUT SIDEWALKS **DETAILS No. 2** 

NO SCALE

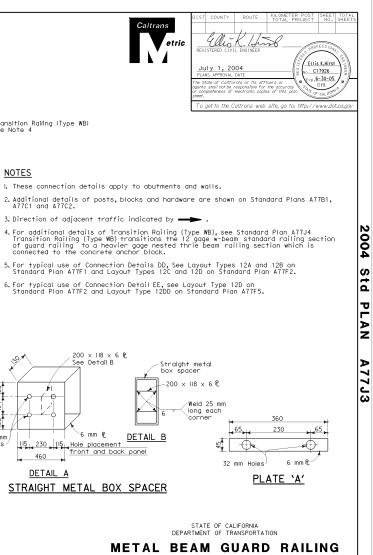
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A77J2

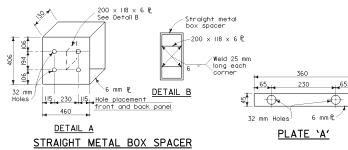


- I. See Standard Plan A77J1 for additional connection details to bridges without sidewalks.
- Additional details of posts, blocks and hardware are shown on Standard Plan A77B1, A77C1 and A77C2.
- 3. Direction of adjacent traffic indicated by  $\longrightarrow$  .
- 4. For additional details of Transition Railing (Type WB), see Standard Plan A77J4. Transition Railing (Type WB) transitions the 12 gage w-beam standard railing section of guard railing to a heavier gage nested thrie beam railing section which is connected to the concrete bridge
- For typical use of Connection Detail AA, see Layout Types 12A and 12B on Standard Plan A77F1, Layout Types 12C and 12D on Standard Plan A77F2, and Layout Type 12E on Standard Plan A77F3.
- For typical use of Connection Detail CC, see Layout Types 12AA and 12BB on Standard Plan A77F4 and Layout Type 12CC on Standard Plan A77F5
- 7. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 25 mm at Connection Detail AA, toper the top of the end of the bridge railing at 1:4 to match the top elevation of the thrie beam railing.



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### METAL BEAM GUARD RAILING **CONNECTIONS TO ABUTMENTS AND WALLS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A77J3

**PLAN** - 125 mm × 125 mm Chamfer Concrete Anchor Block, see Detail C End Cap (Type A) 'A' front and back of bolted connection, total 4 MBGR-End Cap (Type TC) CONNECTION DETAIL EE CONNECTION DETAIL DD ര് See Note 6 See Note 5 **ELEVATION** GUARD RAILING CONNECTION TO ABUTMENT OR WALL Concrete abutment or wall-2860 32 mm ø x 305 mm pipe sleeve, tot. 4 Roadway surface Drill and bond #19 × 610 mm \*I3 | dowels in 25 mm ø holes, tot. I4 Total 20-

\*13 \_\_\_\_\_ tot. 2 \_\_\_\_ ELEVATION

ANCHOR BLOCK FOR TRANSITION RAILING CONNECTION

DETAIL C

Drill and bond threaded

rods in 29 mm dia hole

Concrete abutment or wall-

with epoxy cartridge

M24 Galv HS bolts with washers and nuts, Total 4

**-**4-115\

\_\*I3 <u>610</u> @ 203 max.

953

Straight Metal box spacer,

see Details A and B

Vertical Face

-Thrie beam rail element

wood block -

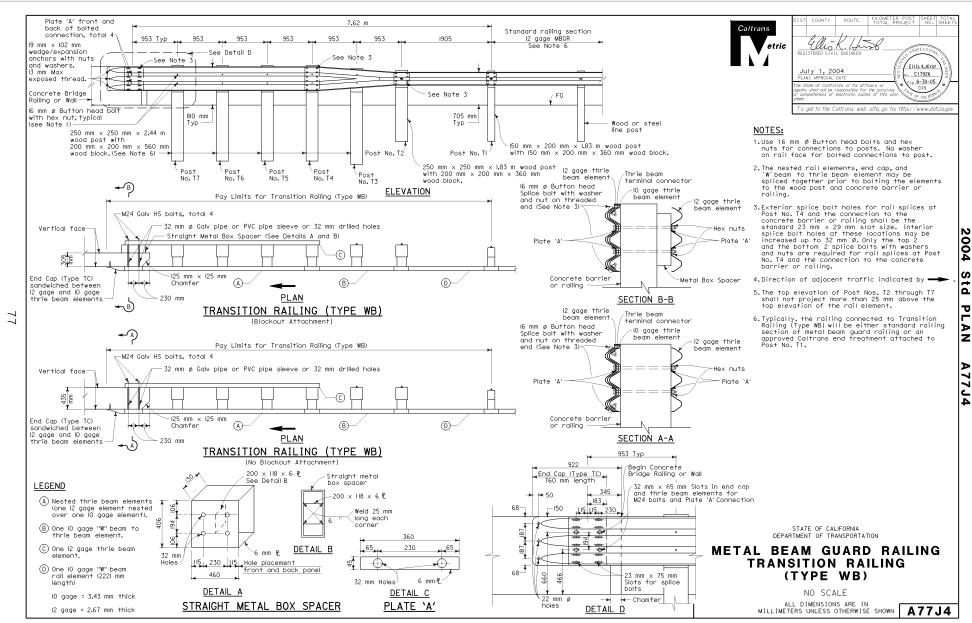
953

~250 mm × 250 mm × 2.44 m wood post

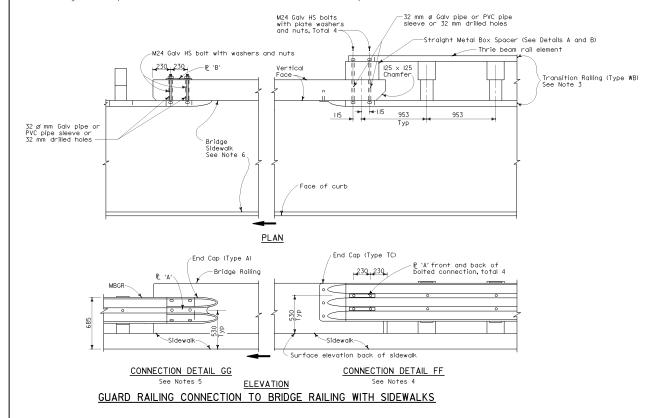
200 mm × 200 mm × 560 mm

Transition Railing (Type WB)

NOTES



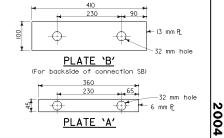
- I. See Standard Plan A77K2 for additional connection details to bridges with sidewalks.
- 2. Direction of adjacent traffic indicated by  $\longrightarrow$  .
- 3. For additional details of Transition Railing (Type WB), see Standard Plan A77J4. Transition Railing (Type WB) transitions the 12 gage w-beam standard railing section of guard railing to a heavier gage nested thrie beam railing which is connected to the concrete bridge railing.
- For typical use of Connection Detail FF, see Layout Types 12A and 12B on Standard Plan A77F1.
- 5. For typical use of Connection Detail GG, see Layout Type 12D on Standard Plan A77F2 and Layout Type 12DD on Standard Plan A77F5.
- 6. Where the bridge sidewalk is not continued beyond the end of the bridge railing, the portion of the sidewalk beyond each end of the bridge railing shall be transitioned down from the top elevation of the sidewalk, for its entire width, to the finished grade of the adjacent roadbed. The longitudinal slope of each sidewalk elevation transition shall not exceed 8.33 percent.



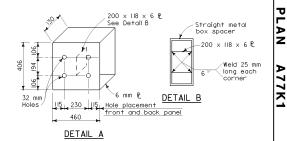
Caltrans

DIST COUNTY ROUTE KILOMETER POST SHEET TOTAL TOTAL PROJECT NO. SHEETS

PROJECT NO. SHEETS OF ALL SHEETS



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STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

STRAIGHT METAL BOX SPACER

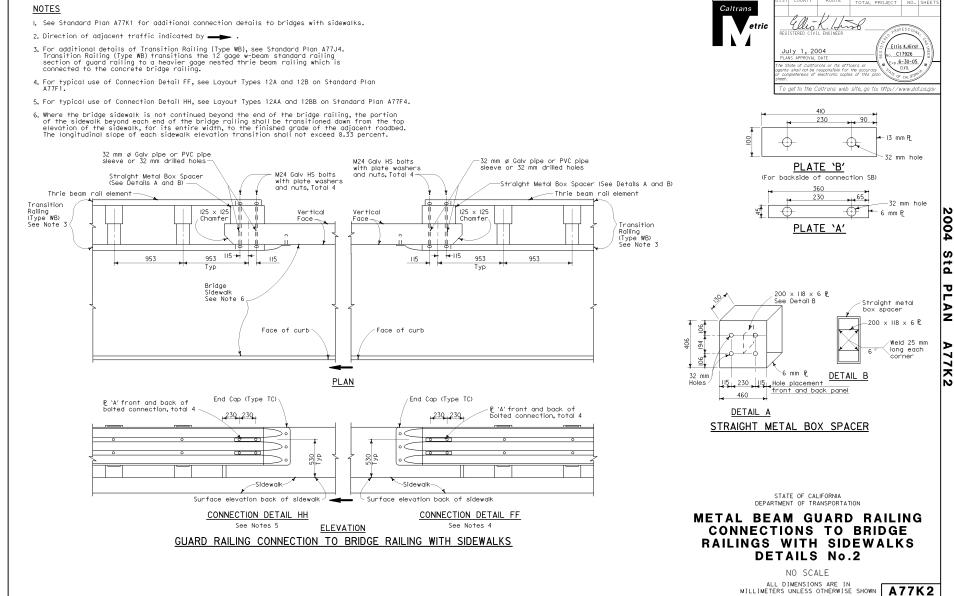
METAL BEAM GUARD RAILING CONNECTIONS TO BRIDGE RAILINGS WITH SIDEWALKS DETAILS No. 1

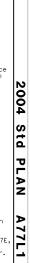
NO SCALE

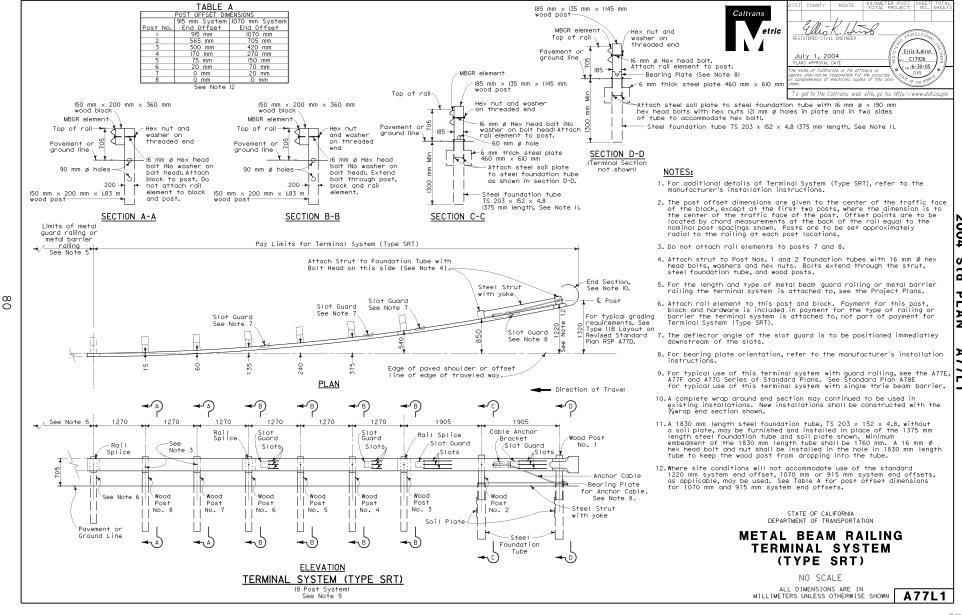
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

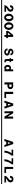
A77K1

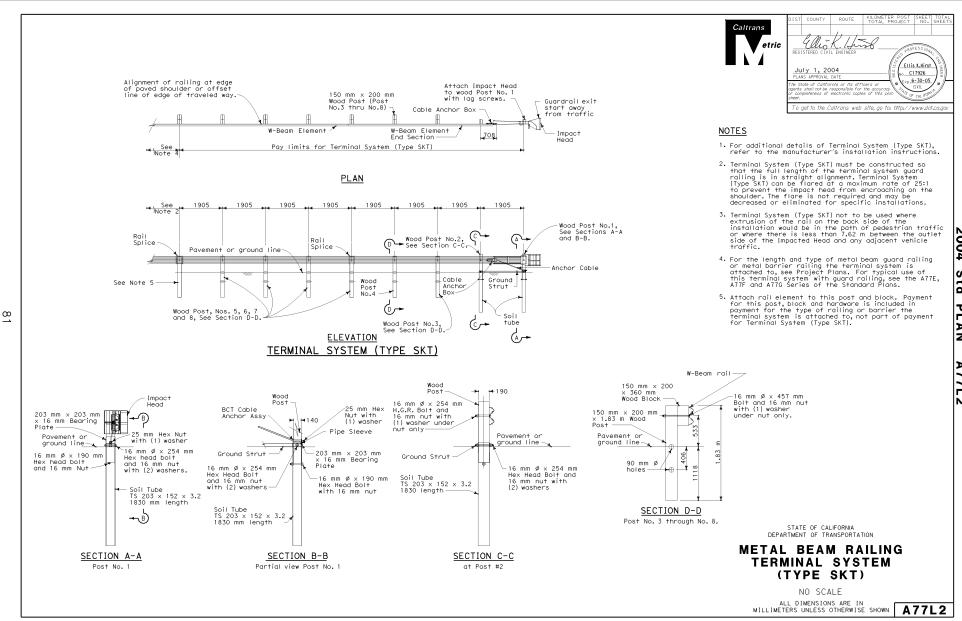
Std

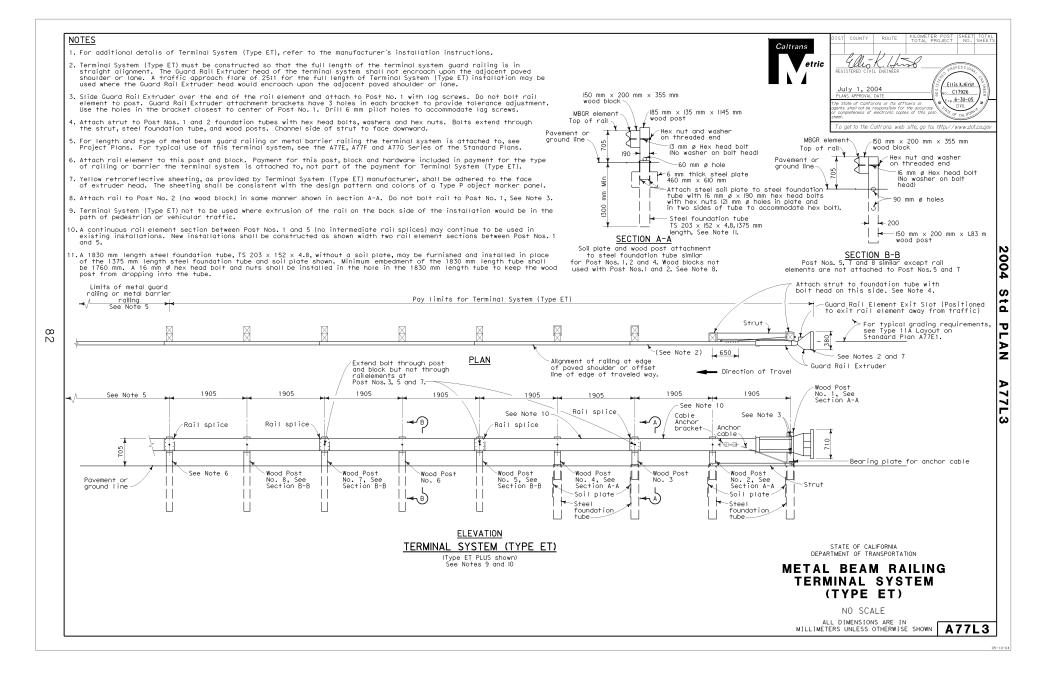


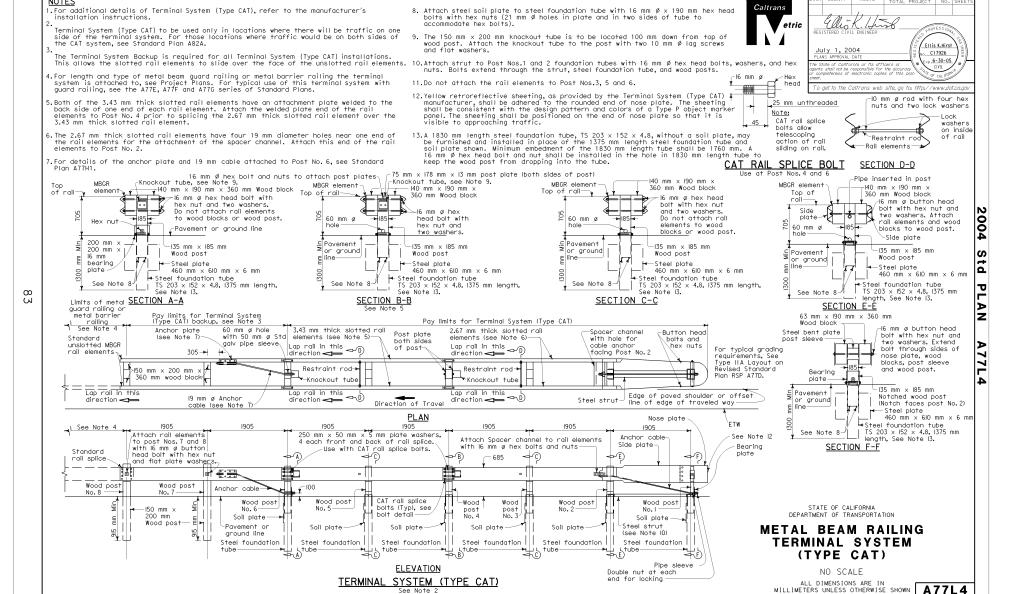










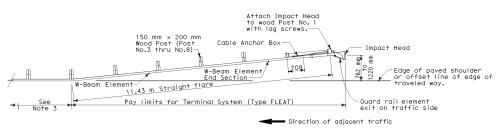






#### <u>NOTES</u>

- For additional details of Terminal System (Type FLEAT), refer to the manufacturer's installation instructions.
- Terminal System (Type FLEAT) not to be used where extrusion of the rail on the front side of the installation would be in the path of pedestrian traffic.
- 3. For the length and type of metal beam guard railing or metal barrier railing the terminal system is attached to, see Project Plans. For typical use of this terminal system with guard railing, see the A77E, A77F and A77C Series of the Standard Plans.
- Attach rail element to this post and block. Payment for this post, block and attaching hardware is included in payment for Terminal System (Type FLEAT).



SECTION C-C

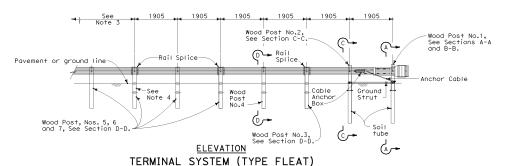
at Post No. 2

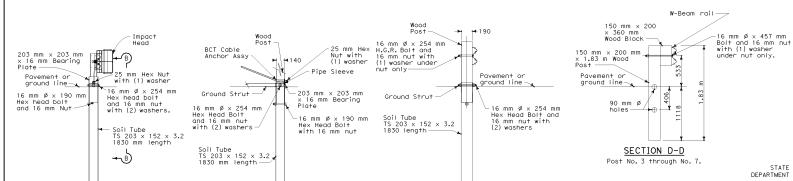
PLAN

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SECTION A-A

Post No. 1





SECTION B-B

Partial view Post No. 1

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

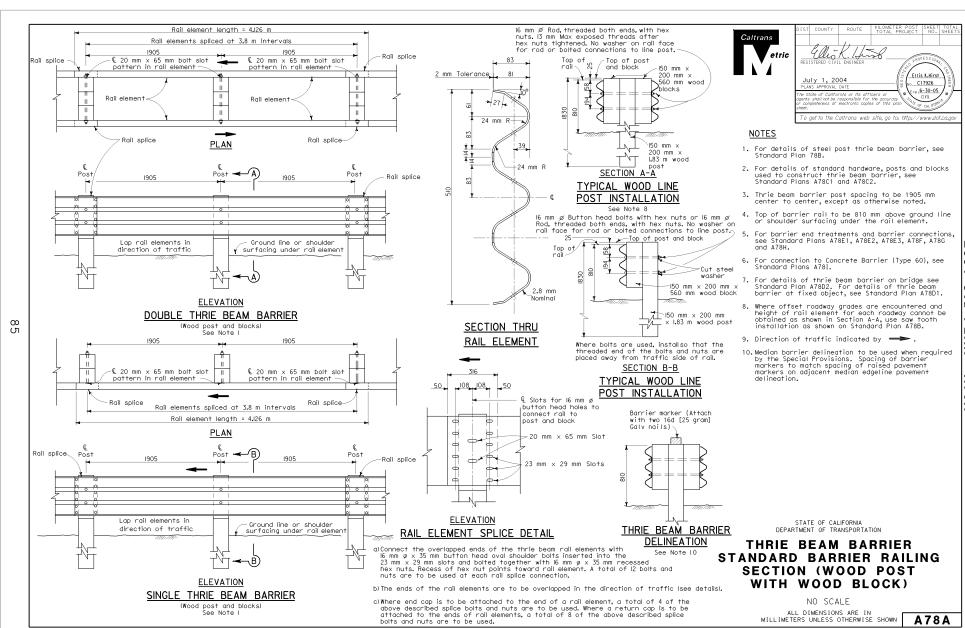
### METAL BEAM RAILING TERMINAL SYSTEM (TYPE FLEAT)

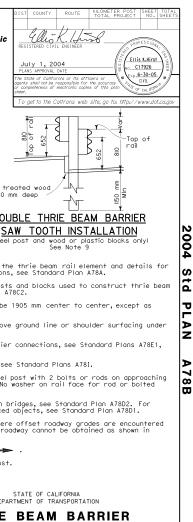
NO SCALE

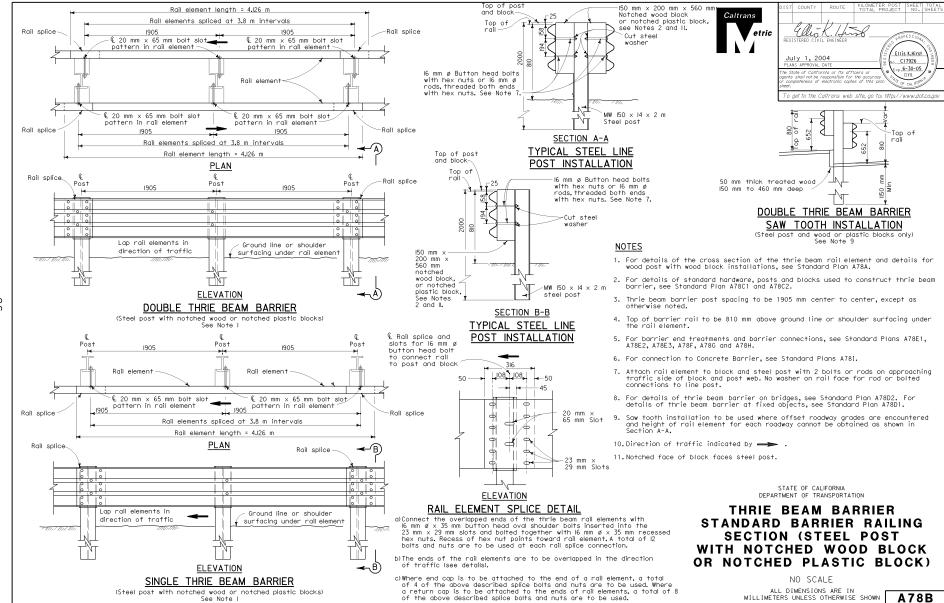
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A77L5









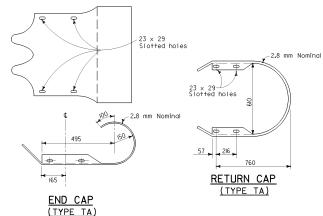


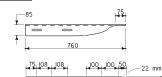


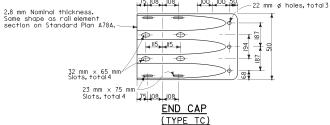


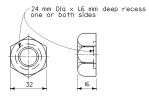
<u>NOTE</u>

1.Flat plate washer detail has been deleted.

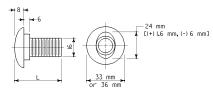








# 16 mm ø RECESS NUT



# 16 mm ø BUTTON HEAD BOLT

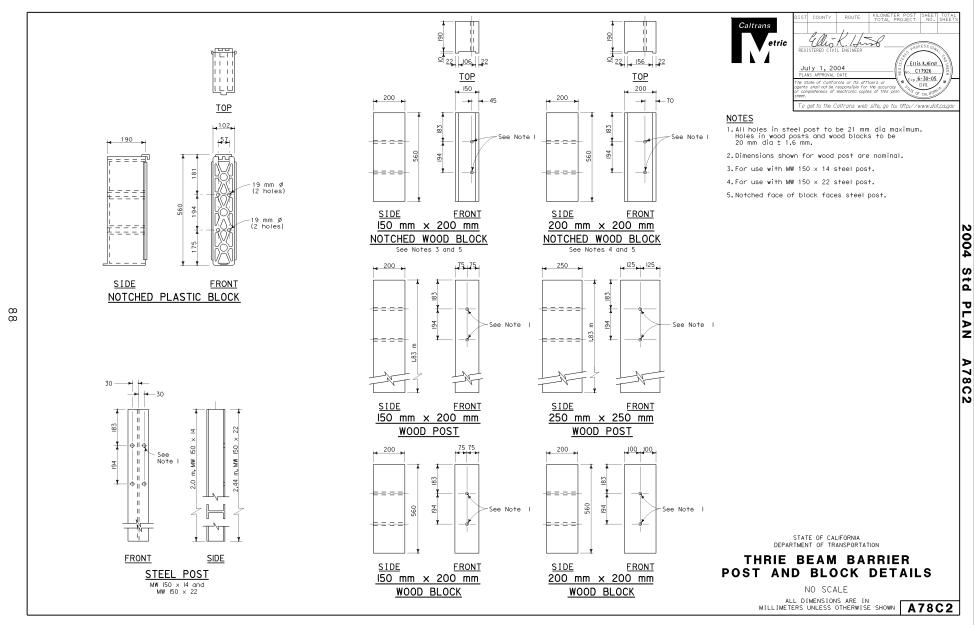
L	THREAD LENGTH
35 mm	full thread length
50 mm	full thread length
255 mm	100 mm Min thread length
460 mm	100 mm Min thread length

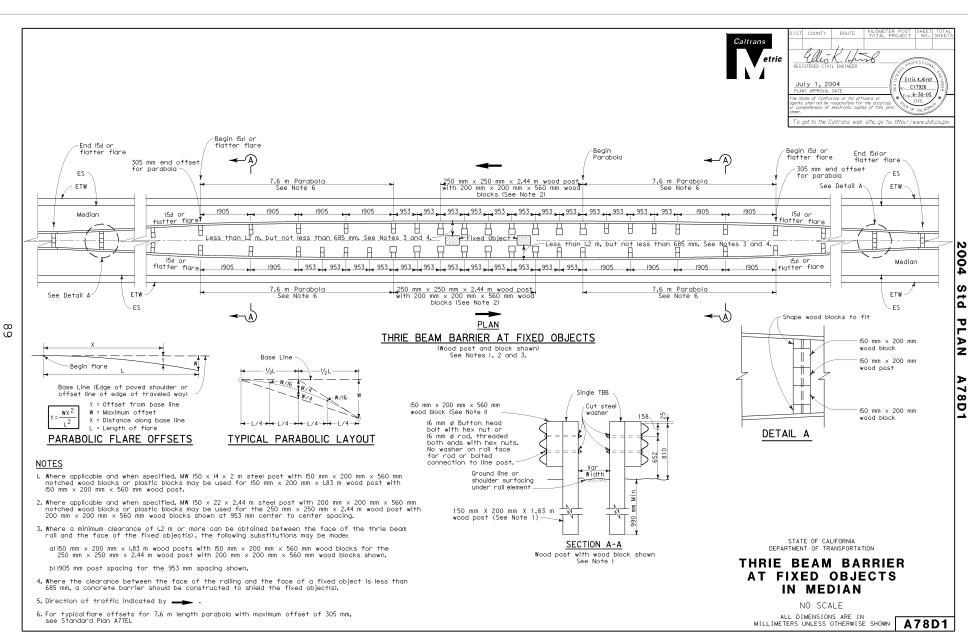
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# THRIE BEAM BARRIER STANDARD HARDWARE DETAILS

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN A78C1





08-09-0

A78D



DIST COUNTY ROUTE KILOMETER POST SKEET TOTAL
TOTAL PROJECT NO. SKEETS

SKEETS

JULY 1, 2004
PLANS APPROVAL DATE
TO Sport Sport

o get to the Caltrans web site, go to: http://www.dof.ca.go

-Cut steel 200 mm × 200 mm × 560 mm Notched wood blocks -16 mm Ø Button head bolt with hex nut or 16 mm o rod, threaded both ends, with hex nuts. Where bolts used, install with threaded end away from traffic side of rail. See Note 2. -MW 150 mm × 22 mm Steel post Ξ 65 mm × 65 mm × 6 mm P washer Base Plate E 360 mm × 360 mm × 19 mm Hex nut ₩ortar JJ → I3 mm Typ 21 mm × 32 mm 360 pad p Slotted holes 50 + 130 130 - 50 Hole, Typ-<u>Cast-in-place</u> Drill and Grout <u>Option</u> <u>Option</u> 22 mm Ø x 200 mm Bolts with hex nut, 4 per post 22 mm Ø x 240 mm Continous threaded rod grouted in 32 mm x 150 mm hole, 4 per post Base Plate BRIDGE POST **BRIDGE ELEVATION** BASE PLATE PLAN POST DETAILS

DOUBLE THRIE BEAM BARRIER ON BRIDGE

90

#### **NOTES**

- See Standard Plan A78B for steel post with notched wood block construction details.
- Attach rall element to wood block and steel post with 2 bolts or rods on approaching traffic side of block and post web. No washer on rall faces for rods or bolted connections to post.

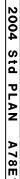
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

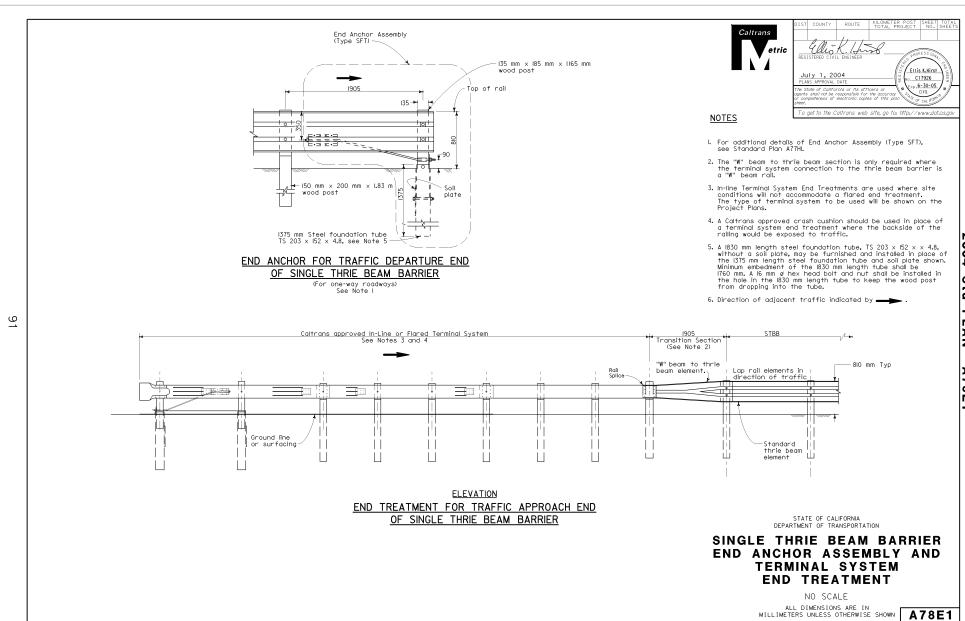
# DOUBLE THRIE BEAM BARRIER ON BRIDGE

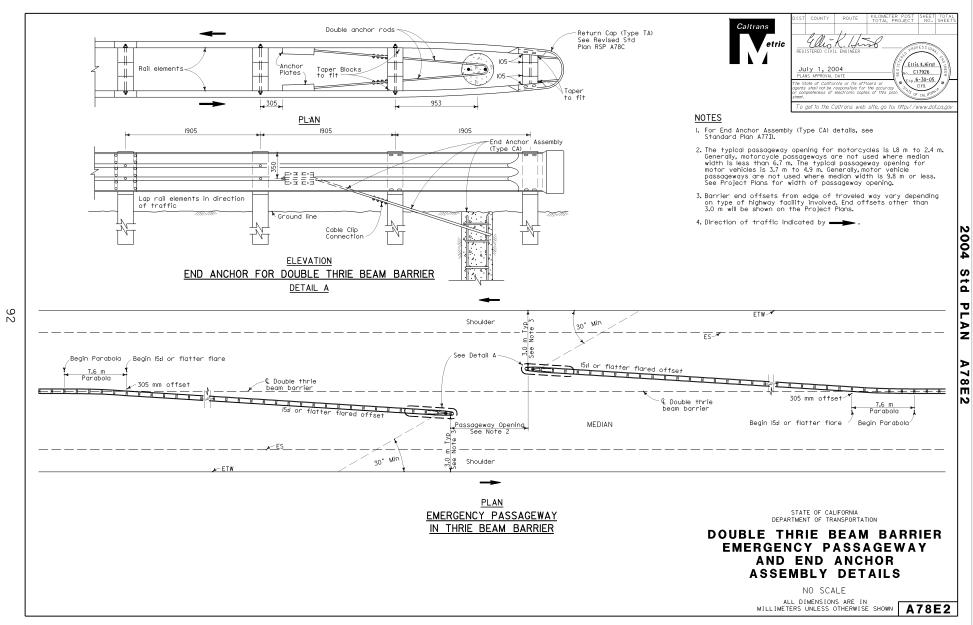
NO SCALE

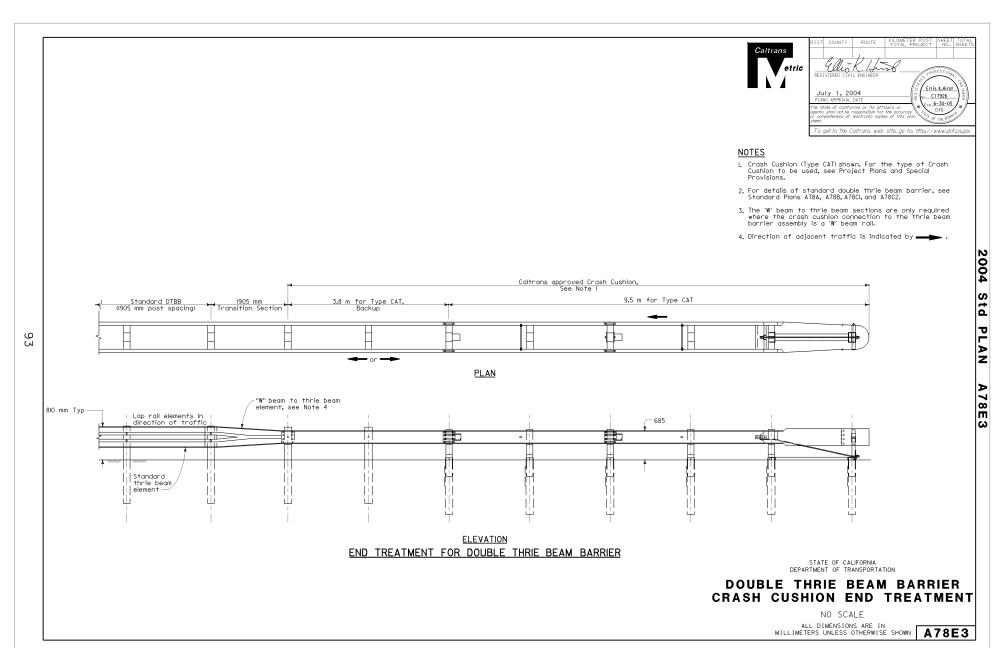
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

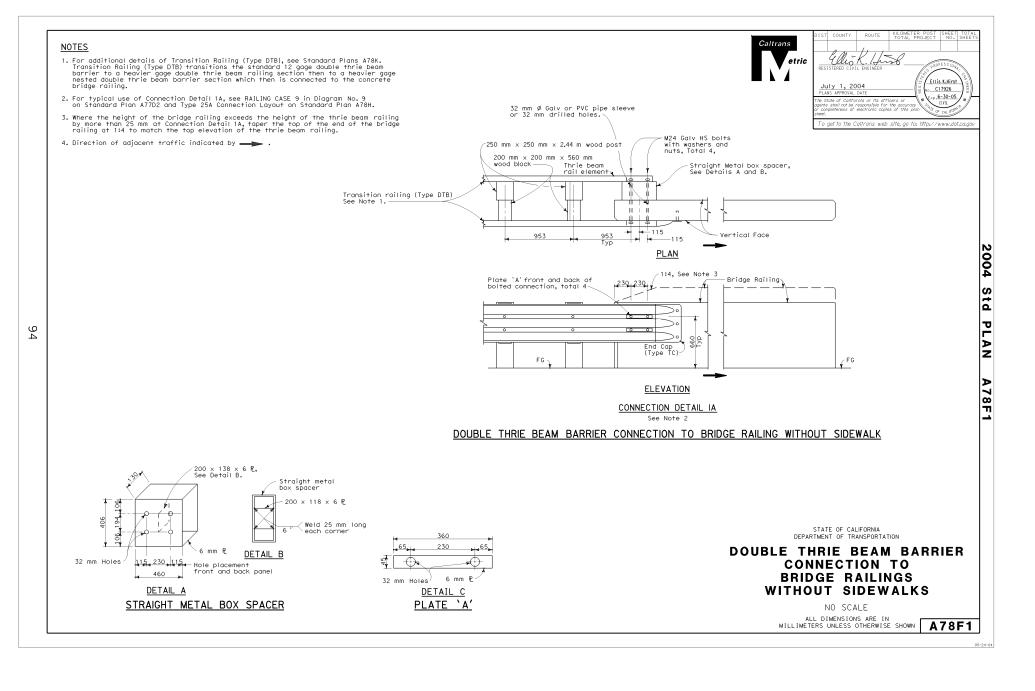
A78D2

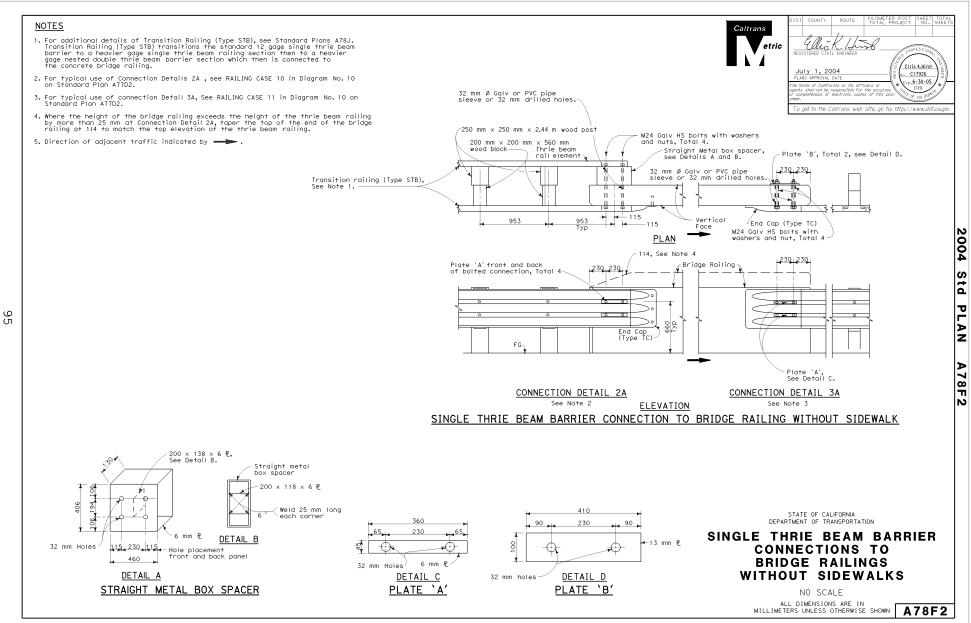


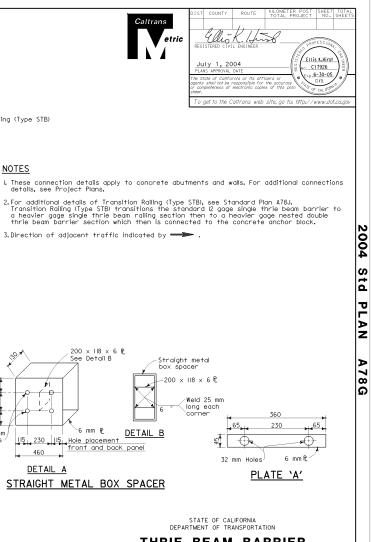








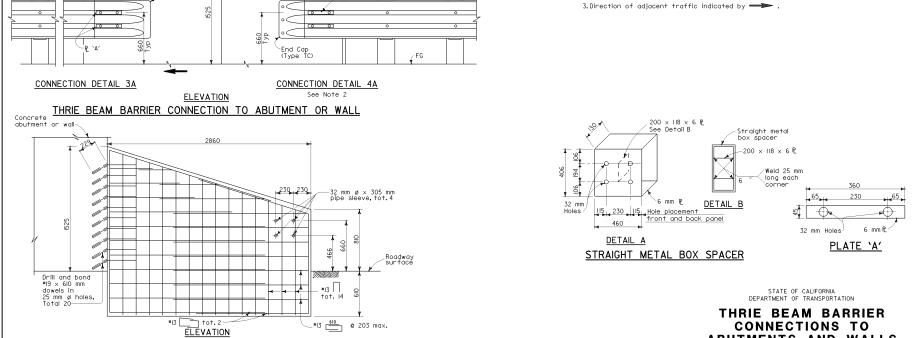




**ABUTMENTS AND WALLS** 

NO SCALE ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A78G



with washers and

Typ - - 115

230, 230

Concrete Anchor Block,

see Detail C

953

-Thrie beam rail element

wood block -

953

of bolted connection, total 4

125 mm × 125 mm Chamfer

P 'A' front and back

-250 mm × 250 mm × 2.44 m wood post

200 mm × 200 mm × 560 mm

Transition Railing (Type STB)

NOTES

details, see Project Plans.

nuts, Total 4-

Straight Metal box spacer, see Details A and B-

Vertical Face

PLAN

ANCHOR BLOCK FOR TRANSITION RAILING CONNECTION

DETAIL C

Drill and bond threaded rods in

29 mm dia hole with epoxy cartridge

End Cap (Type TC)

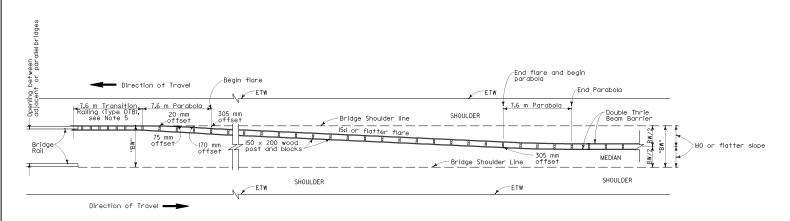
-Concrete abutment or wall-

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTA
	Ga	K / h=			
Ju	ISTERED CIVI	004	137	s K.Hirst	121
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NOTES

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- Line post, blocks and hardware to be used are shown on Standard Plans A78A, A78B, A78Cl, and A78C2.
- 2. Post spacing to be 1905 mm center to center, except as otherwise noted.
- 3. Except as noted, line posts are I50 mm × 200 mm × 1.83 m wood with I50 mm × 200 mm × 560 mm wood blocks. MW I50 × I4 steel posts, 2.0 m in length, with I50 mm × 200 mm × 560 mm notched wood blocks or plastic blocks may be used for I50 mm × 200 mm × 1.83 m wood posts with I50 mm × 200 mm × 560 mm wood blocks where applicable and when specified.
- 4. Direction of adjacent traffic indicated by ---- .
- 5. For Transition Railing (Type DTB) details, see Standard Plan A78K.



TYPE 25A CONNECTION LAYOUT

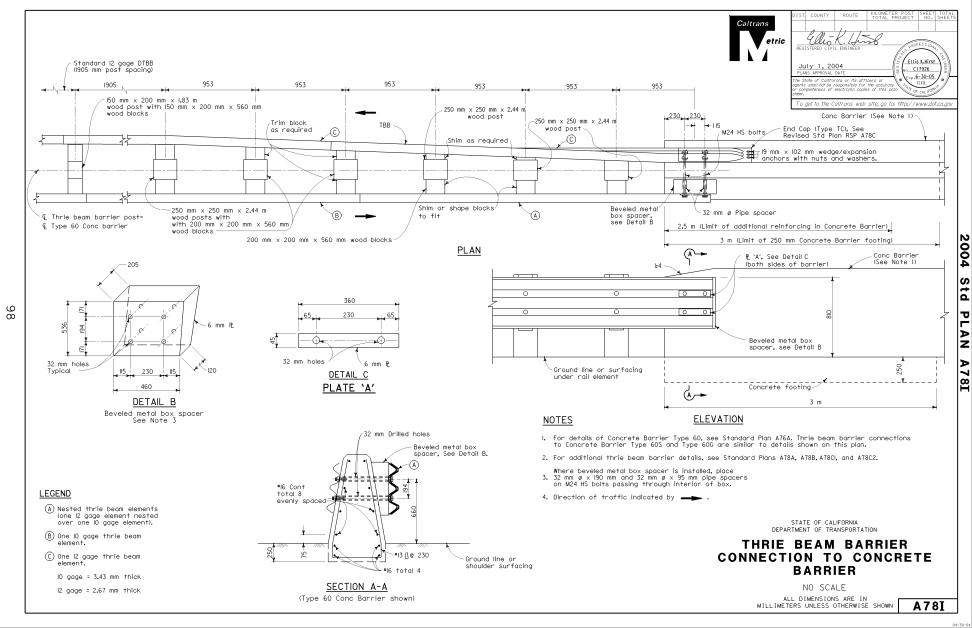
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

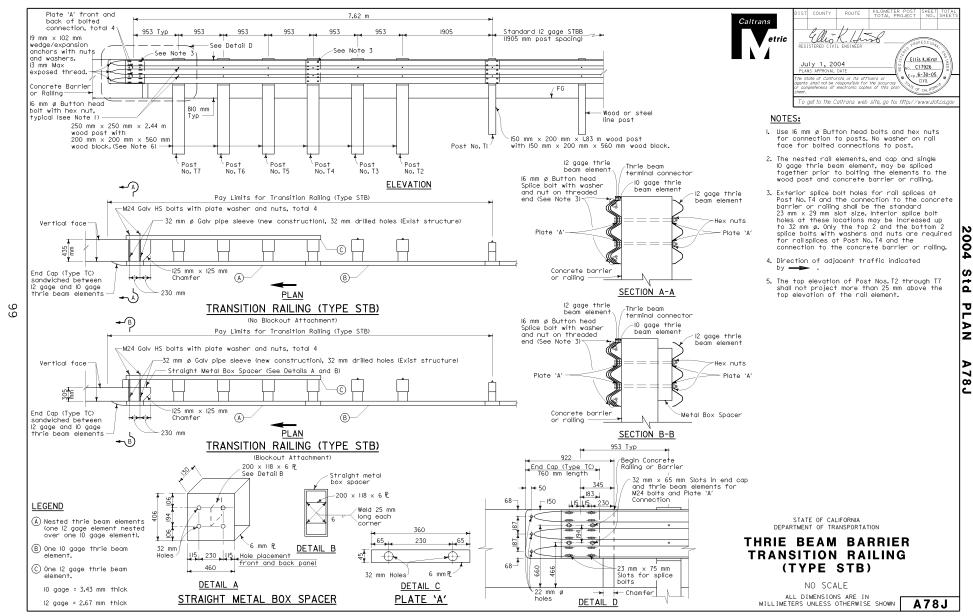
THRIE BEAM BARRIER TYPICAL LAYOUT FOR CONNECTION TO **BRIDGE RAILING** 

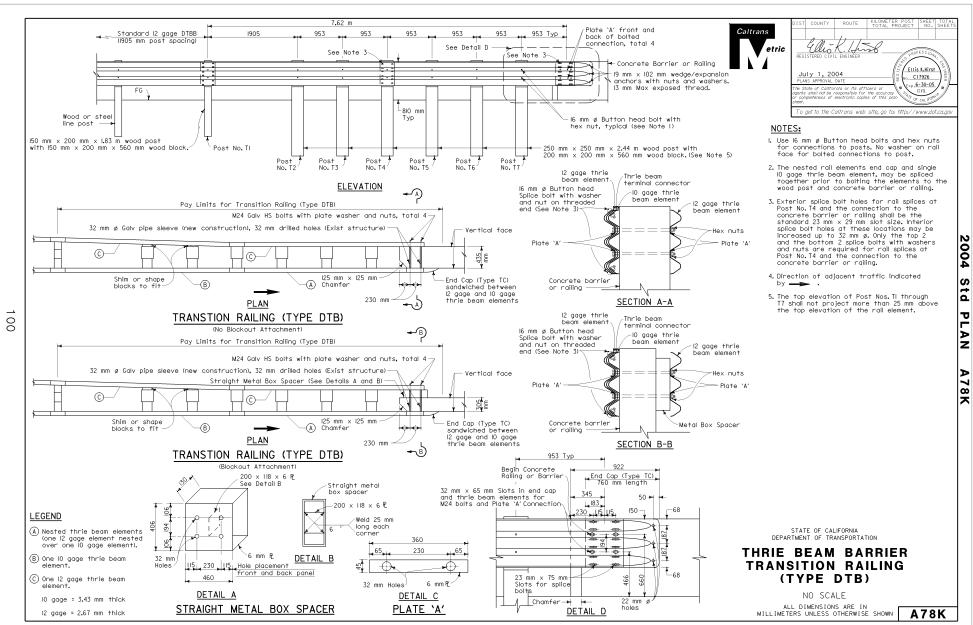
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**A78H** 

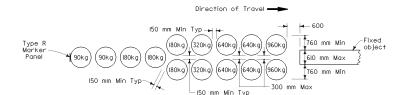






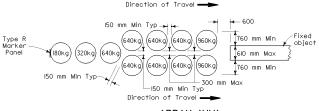






# ARRAY 'UI4'

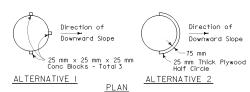
Approach speed 100 km/h or less



9

#### ARRAY 'UII'

Approach speed 70 km/h or less



Sand Filled Module Surface-Downward Slope 5% Max Plywood Blocking for Alternative 2 ELEVATION

### BRIDGE DECK MODULE BLOCKING DETAILS

(See Note 6)

# SLOPED SEAT DETAIL (See Note 4)

ELEVATION

Sand Filled Module

Surface-

13 mm Min

5% Max



50 mm Min (Typ)

Downward Slope Greater Than 5%

AC or Epoxy Mortar Base to New Slope

# PAINTING DETAIL

(See Note 5)

### **NOTES**

- I.  $(\times \times)$  Indicates module location and mass of sand in kilograms for each module. Module spacing is based on the greater diameter of the modules.
- 2. All sand masses are nominal.
- Each module is to contain amount of sand indicated, supported according to the manufacturer's instructions.
- 4. Modules shall be placed on asphalt concrete, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
- 5. Mass of sand and outline of each module shall be painted on the surface at each module location.
- Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
- 7. Place the top of the Type R marker panel 25 mm below the module lid.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

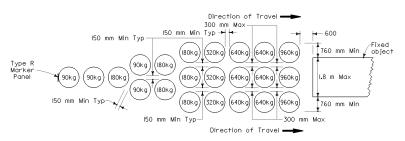
# CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

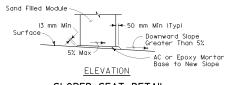
**A81A** 

ROUTE KILOMETER POST TOTAL PROJECT



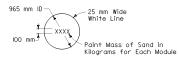
# ARRAY 'U2I'

Approach speed 100 km/h or less



# SLOPED SEAT DETAIL

(See Note 4)



# PAINTING DETAIL

(See Note 5)

Direction of

-75 mm

——► Downward Slope

# **NOTES**

- I.  $(\times\!\times\!\times\!)$  Indicates module location and mass of sand in kilograms for each module. Module spacing is based on the greater diameter of the
- 2. All sand masses are nominal.
- according to the manufacturer's instructions.
- 4. Modules shall be placed on asphalt concrete, epoxy mortar or concrete
- surface at each module location.
- 7. Place the top of the Type R marker panel 25 mm below the module lid.

- 3. Each module is to contain amount of sand indicated, supported
- surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
- 5. Mass of sand and outline of each module shall be painted on the
- Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

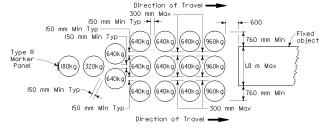
# CRASH CUSHION. SAND FILLED (UNIDIRECTIONAL)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

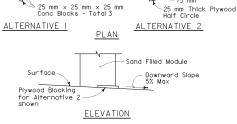
**A81B** 

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### ARRAY 'UI6'

Approach speed 70 km/h or less



Direction of

Downward Slope

# BRIDGE DECK MODULE BLOCKING DETAILS

(See Note 6)

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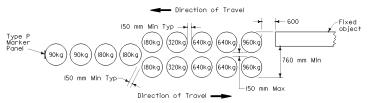
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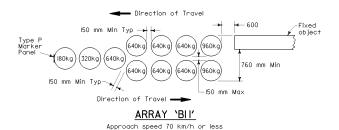






# ARRAY 'BI4'

Approach speed IOO km/h or less



03

#### Direction of Direction of Downward Slope Downward Slope -75 mm 25 mm × 25 mm × 25 mm Conc Blocks - Total 3 25 mm Thick Plywood Half Circle ALTERNATIVE I ALTERNATIVE 2 PLAN

Sand Filled Module Surface-Downward Slope 5% Max Plywood Blocking for Alternative 2 ELEVATION

# BRIDGE DECK MODULE BLOCKING DETAILS

# ELEVATION SLOPED SEAT DETAIL

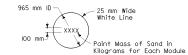
(See Note 5)

Sand Filled Module

Surface-

13 mm Min

5% Max



### PAINTING DETAIL

(See Note 6)

# **NOTES**

50 mm Min (Typ)

Downward Slope Greater Than 5%

AC or Epoxy Mortar Base to New Slope

- I.  $\overbrace{\text{NN}}$  Indicates module location and mass of sand in kilograms for each module. Module spacing is based on the greater diameter of the module.
- 2. All sand masses are nominal.
- 3. Each module is to contain amount of sand indicated, supported according to the manufacturer's instructions.
- 4. Bidirectional crash cushion arrays may be angled toward approaching traffic. Amount of angle not to exceed 10 degrees.
- Modules shall be placed on asphalt concrete, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
- 6. Mass of sand and outline of each module shall be painted on the surface at each module location.
- 7. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
- 8. Place the Type P marker panel so that the bottom of the panel is at the bottom of the module.

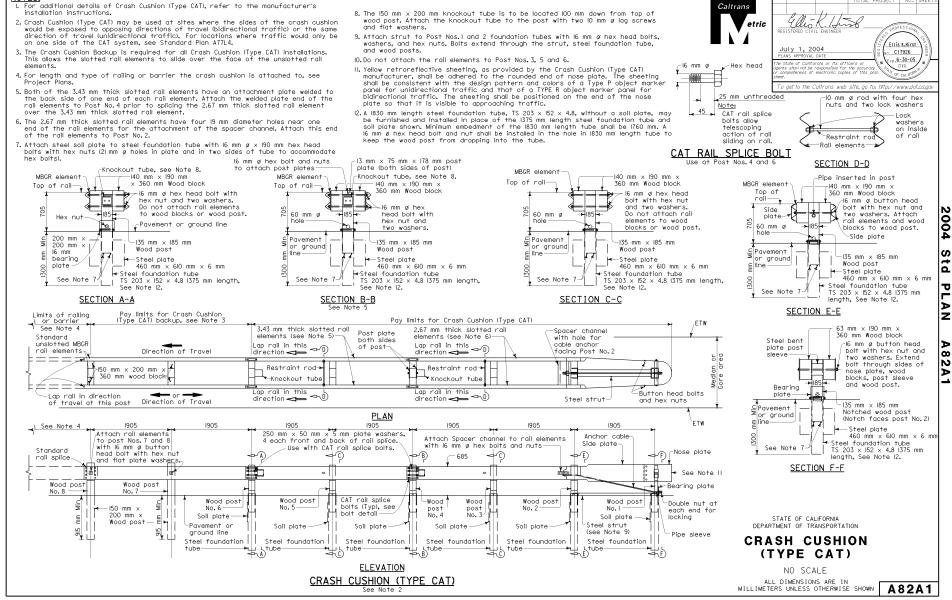
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

# CRASH CUSHION, SAND FILLED (BIDIRECTIONAL)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**A81C** 



NOTES:

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ROUTE KILOMETER POST TOTAL PROJECT

Caltrans

**←** or **−** 

Direction of Travel

Ellis K. Ihrob Ellis K.Hirst C17926 6-30-05 To get to the Caltrans web site, go to: http://www.dot.ca.go

€ of Crash Cushion in same alignment as € of barrier or railing

#### NOTES:

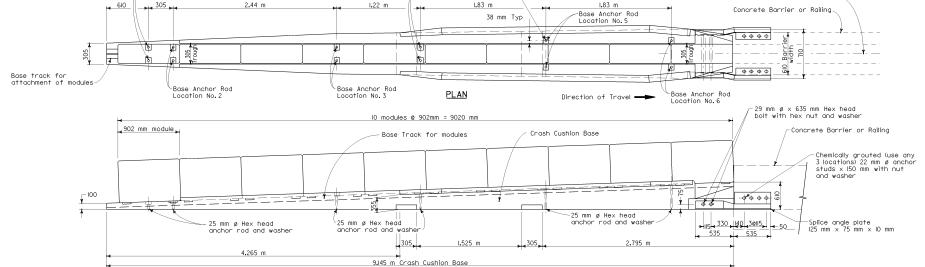
05

- I. For additional details of Crash Cushion (Type ADIEM), refer to the manufacturer's installation instructions.
- 2. Crash Cushion (Type ADIEM) may be used at sites where the sides of the crash cushion would be exposed to opposing directions of travel (bidirectional traffic) or the same direction of travel (unidirectional traffic).
- 3. The crash cushion concrete base shall be placed on a smooth surface (pavement or well compacted soil base) on the same horizontal plane as the barrier or railing it is to be attached to.
- 4. Installation of the crash cushion concrete base shall be accomplished by driving the anchor rods in well compacted soil base or soft asphalt concrete or by driving the anchor rods in drilled holes in hard asphalt concrete or portland cement concrete. See Table A for the location and lengths of anchor rod to be used.
- 5. Attach the crash cushion to the barrier or railing by bolting the splice angle plates to the crash cushion and the barrier or railing.
- 6. Lubricate the crash cushion base track and slide the modules along the track to the positions shown.

Base Anchor Rod

Location No. I

- 7. Yellow retroreflective sheeting, as provided by the crash cushion manufacturer, shall be adhered to the first module facing approaching traffic. This sheeting shall be consistent with the design pattern and colors of a Type P object marker panel for unidirectional traffic and that of the Type R object marker panel for bidirectional traffic.
- 8. For the length and type of barrier or railing the crash cushion is to be attached to, see the Project Plans.



38 mm ø Hole for 25 mm ø Anchor Rods in 75 mm square recess, 38 mm deep (12 places)

-Base Anchor Rod Location No. 4

### TABLE A

BASE ANCHOR RODS AND LOCATIONS	PORTLAND CEMENT CONCRETE PAVEMENT	ASPHALT CONCRETE PAVEMENT	WELL COMPACTED BASE
	Rod Length	Rod Length	Rod Length
2 at Location No. I	455 mm	610 mm	760 mm
2 at Location No. 2	455 mm	610 mm	760 mm
2 at Location No. 3	610 mm	760 mm	915 mm
2 at Location No. 4	610 mm	760 mm	915 mm
2 at Location No. 5	915 mm	1065 mm	1220 mm
2 at Location No. 6	915 mm	1065 mm	1220 mm

### **ELEVATION** CRASH CUSHION (TYPE ADIEM) See Note 3

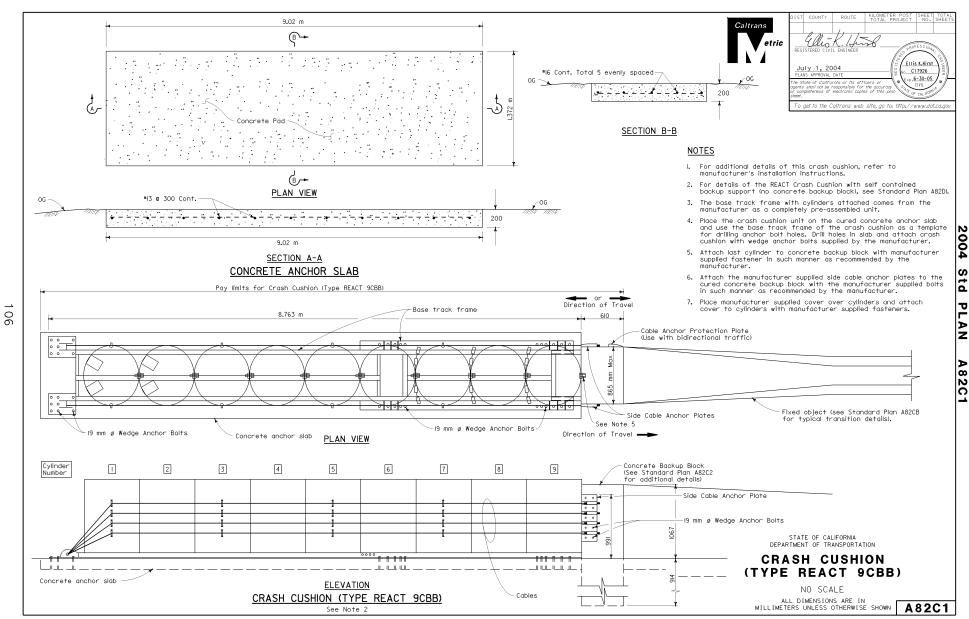
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

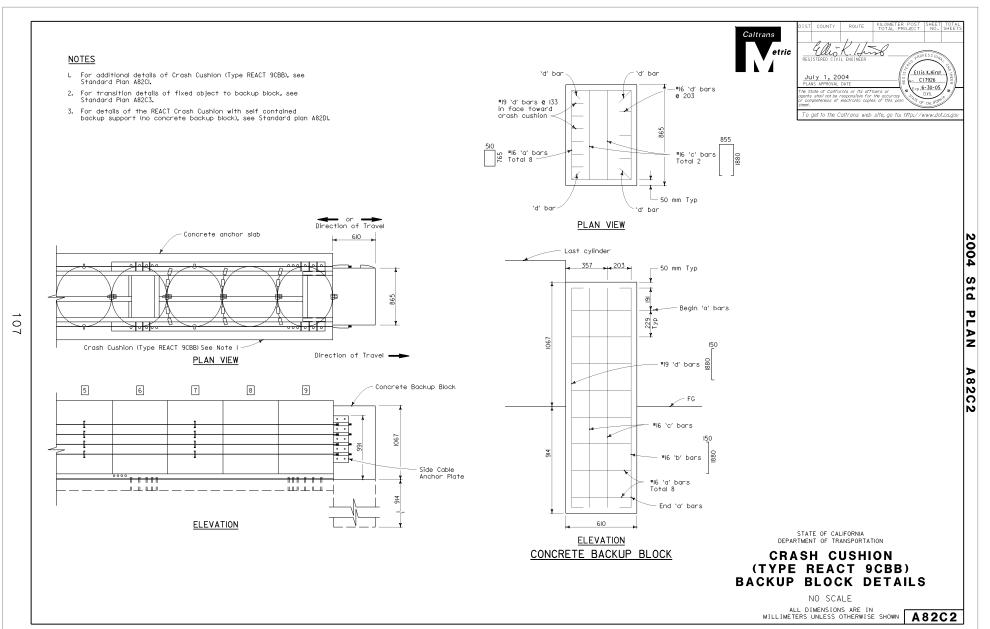
# **CRASH CUSHION** (TYPE ADIEM)

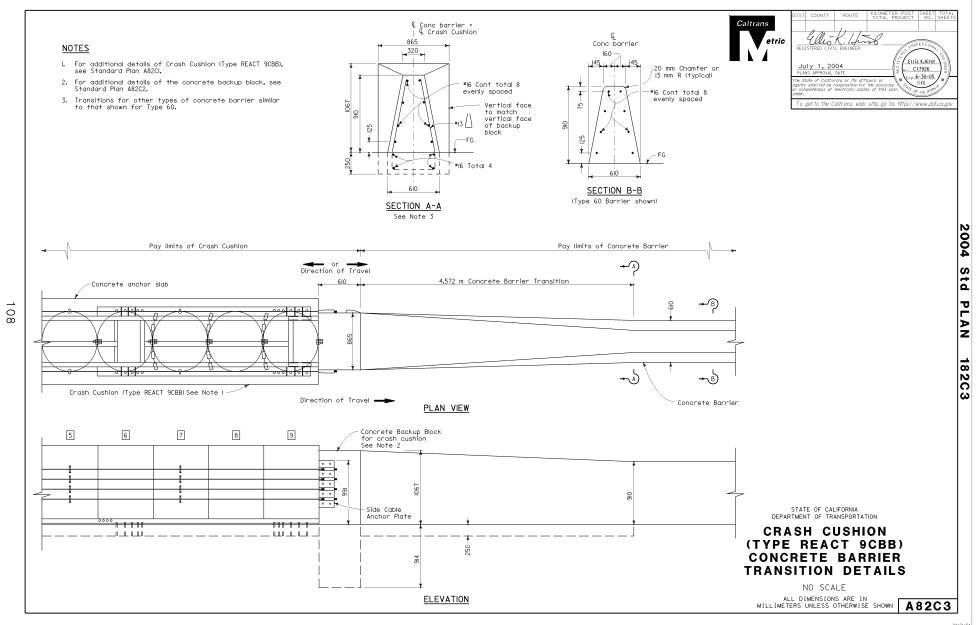
NO SCALE

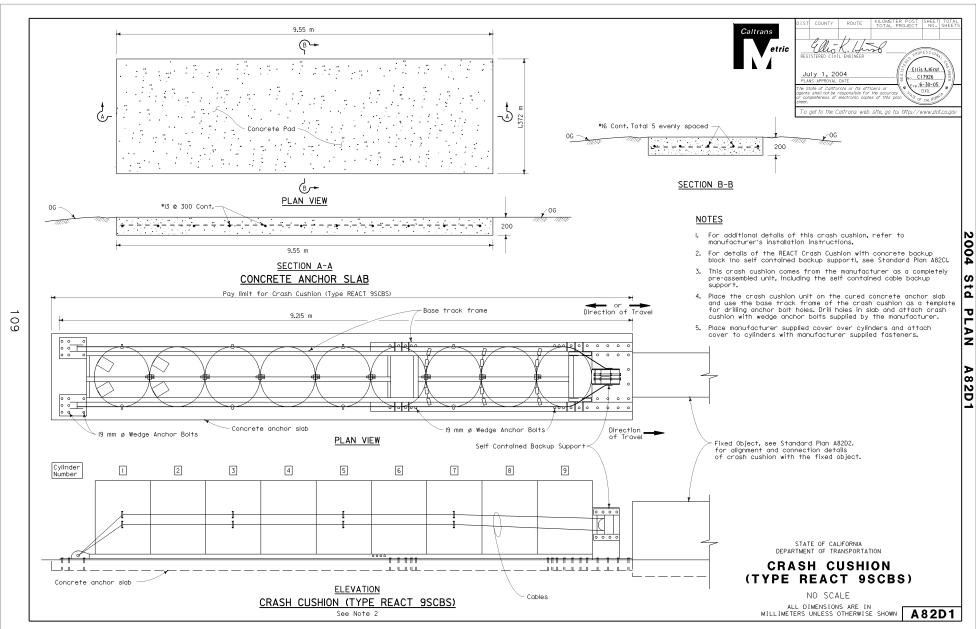
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

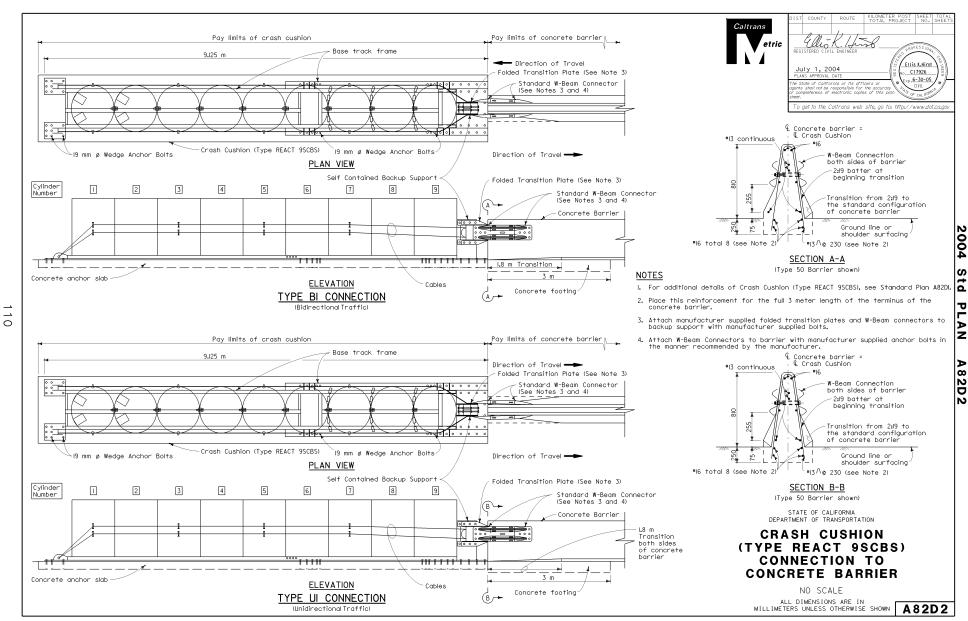
A82B1





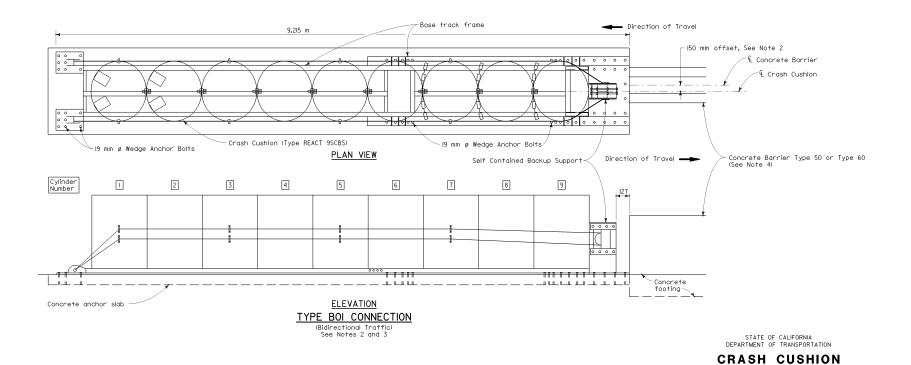






DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL
		/, .			
	ESTERED CIVE		Enis	ESS ION	78
	NS APPROVAL		₩ (No. C1	7926 -30-05	-) #JL
agents	shall not be i	rnia or its affi respansible for electronic copie	the accuracy		) » [
Τo	get to the C	altrans web	site, go to: http://v	vww.do	t.ca.gov

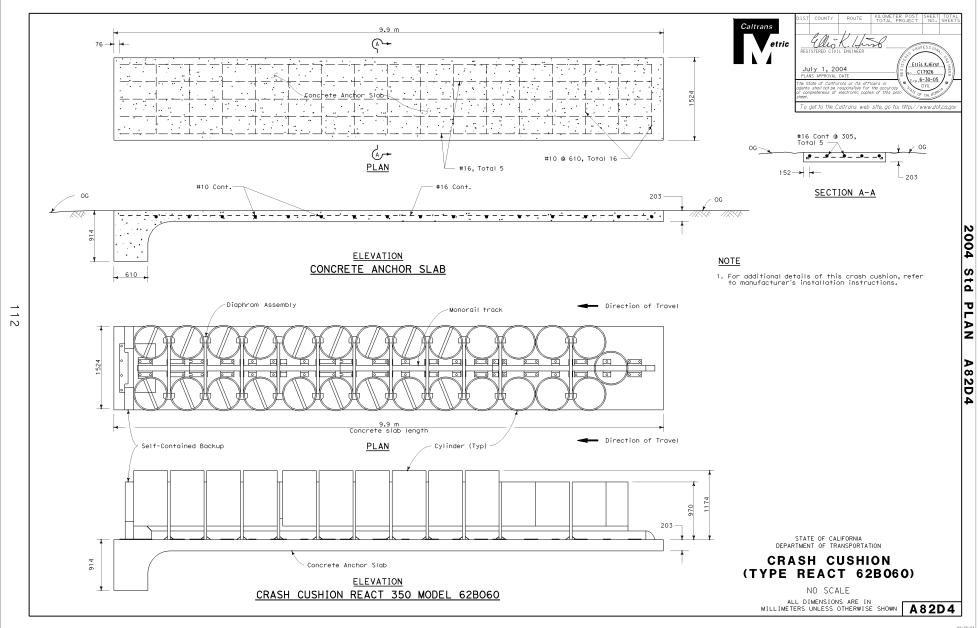
- 1. For additional details of Crash Cushion (Type REACT 9SCBS), see Standard Plan A82D1.
- 2. The 150 mm offset of the centerline of the crash cushion from the centerline of barrier is only to be used for bidirectional traffic locations.
- 3. Where sufficient median width is not available to offset the crash cushion, as shown, see Standard Plans A82D2 and A82C3.
- 4. For details of typical concrete barrier end anchorage, see Standard Plan A76B.

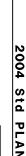


**ALIGNMENT OFFSET DETAILS** NO SCALE

(TYPE REACT 9SCBS)

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN A82D3



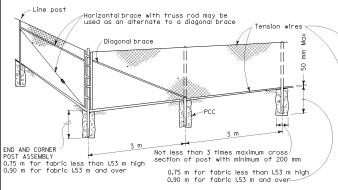


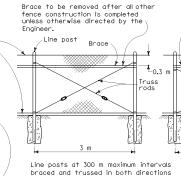




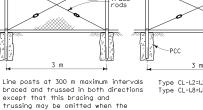
Latch post





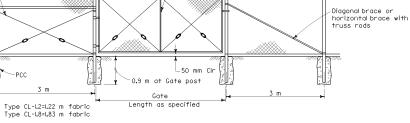


fabric is stretched by the equipment



Horizontal brace with

9.5 mm steel truss rods



Vertical stay

Gate panel

Gate post

TYPICAL MEMBER DIMENSIONS (See Notes) END. LATCH & CORNER POSTS LINE POSTS BRACES FENCE ROUND ROLL FORMED ROUND ROLL FORMED HEIGHT ROLL ROUND FORMED ΙD ΙD 32 41 x 32 44 × 32 40 48 x 41  $48 \times 41$ 50 89 x 89 51 x 44  $38 \times 33$ & less 0ver 1.83 m 50 57 x 51 51× 44 89 x 89 63 × 63 32  $38 \times 33$ 41 x 32

# R/W -150 mm or as specified specified or or shown on shown on detail plans detail plans (See Note 6) (See Note 6) HIGHWAY OTHER FREEWAYS HIGHWAYS

W

### FENCE LOCATION

- The above table shows examples of post and brace sections which may comply with the Specifications.
- 2. Sections shown in the tables must also comply with the strength requirements and other provisions of the Specifications.
- 3. Other sections which comply with the strength requirements and other provisions of the Specifications may be used on approval of the Engineer.
- 4. Options exercised shall be uniform on any one project.
- 5. Dimensions shown are nominal.
- 6. Offset to be 0.60 m at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 6 m long.

GATE POST			
FENCE HEIGHT	GATE WIDTHS (m)	NOMINAL I D (mm)	MASS PER METER (kg)
	Up thru 1.83	65	7.37
1.83 m and	0ver 1.83 thru 3.66	100	16.06
Less	0ver 3.66 thru 5.49	125	21.76
	0ver 5.49 to 7.32 max	150	28.23
	Up thru 1.83	80	11.28
	0ver 1.83 thru 3.66	125	21.76
0ver	0ver 3.66 thru 5.49	150	28.23
	0ver 5.49 to 7.32 max	200	42.49

Above post dimensions and masses are minimums. Larger sizes may be used on approval of the Engineer.

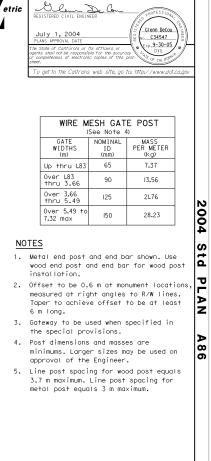
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# CHAIN LINK FENCE

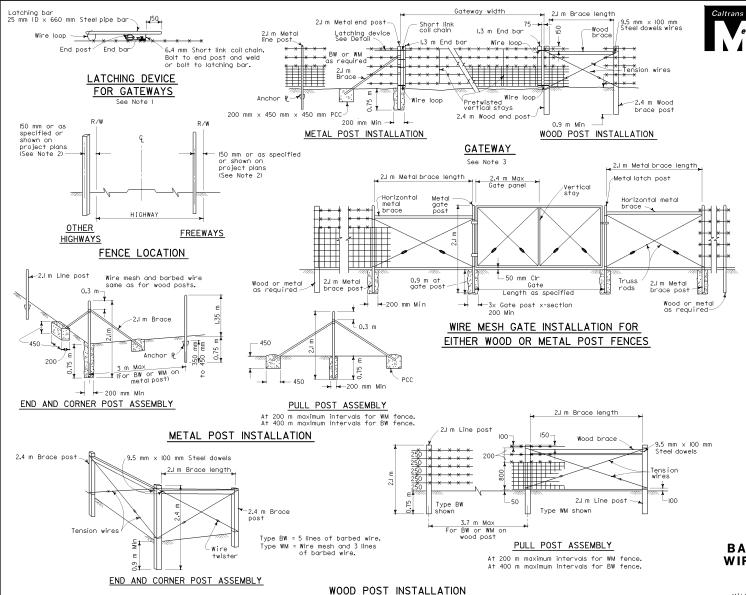
NO SCALE

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A85



ROUTE



 $\rightarrow$ 

4

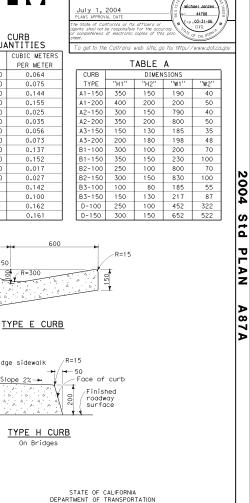
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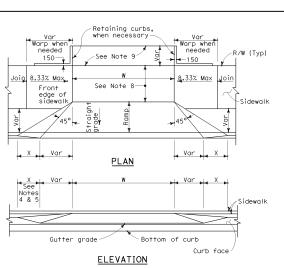
# BARBED WIRE AND WIRE MESH FENCES

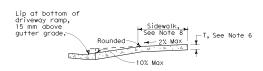
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

A86

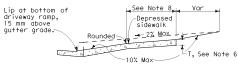






# CASE A

Typical driveway, sidewalk not depressed

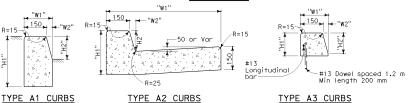


#### CASE B

Driveway with depressed sidewalk

# SECTIONS





R=15

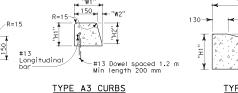
See Table A

TYPE B2 CURBS

See Table A

50 or Var

130 "W2"



Min length 200 mm

**CURBS** 

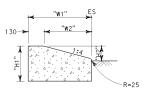
Superimposed on existing pavement

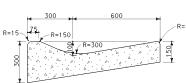
See Table A

130

TYPE B3 CURBS

Superimposed on existing pavement See Table A





Caltrans

CURB QUANTITIES

0.064

0.075

0.144

0.155

0.025

0.035

0.056

0.073

0.137

0.152

0.017

0.027

0.142

0.100

0.162

0.161

A1-150

A1-200

A2-150

A2-200

A3-150

A3-200

B1-100

B1-150

B2-100

B2-150

B3-100

B3-150

В4

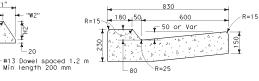
D-100

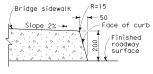
D-150

Ε

# TYPE D CURBS

See Table A





TYPE B4 CURBS

### NOTES

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- 1.Case A driveway section typically applies.
- Use Case B driveway section when ramp slopes would exceed 10% in Case A.

TYPE B1 CURBS

See Table A

See Table A

130

- 3.Use Case B driveway section when sidewalk cross slope would exceed 2% in Case A.
- 4.X=900 mm except for curb heights over 250 mm where 1:4 slopes shall be used on curb slope.
- 5.X is a variable when sidewalk is located where wheelchairs may traverse the surface. Slopes shall not exceed 8.33%.
- Sidewalk and ramp thickness ``T" at driveway shall be 100 mm for residental and 150 mm for commercial.

Longitudinal bar

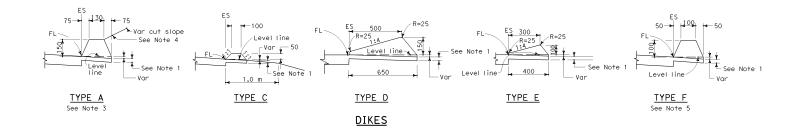
- 7. Difference in slope of the driveway ramp and the slope of a line between the gutter and a point on the roadway 1.5 meters from gutter line shall not exceed 15%. Reduce driveway ramp slope, not gutter slope, where required.
- 8. Minimum width of clear passageway for sidewalk shall be 1.22 meters. Where right of way restrictions, natural barriers or other existing conditions create an unreasonable hardship, the clear passageway width may be reduced to 915 mm
- Retaining curbs and acquisition of construction easement may be necessary for narrow sidewalks or curb heights in excess of 150 mm.

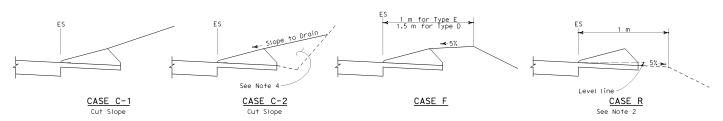
# **CURBS AND DRIVEWAYS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN







### TYPE D AND E BACKFILL DETAILS

### **NOTES**

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- For AC shoulders only, extend top layer of AC placed on the shoulder under dike with no joint at the ES.
- 2.Case R applies to retrofit only projects where restrictive conditions do not provide enough width for Case F backfill.
- 3. Type A dike only to be used where restrictive slope conditions do not provide enough width to use Type D or Type E dike.
- 4.Fill and compact with excavated material to top of dike.
- 5.Use Type F dike, where dike is required with guard railing installations. See Standard Plan A77F for dike positioning details.

6. Type B dike deleted.

### DIKE QUANTITIES

	COBIC METERS
TYPE	PER METER
Α	0.033
С	0.009
D	0.065
Ε	0.027
F	0.016

Ouantities based on 5% cross slope.

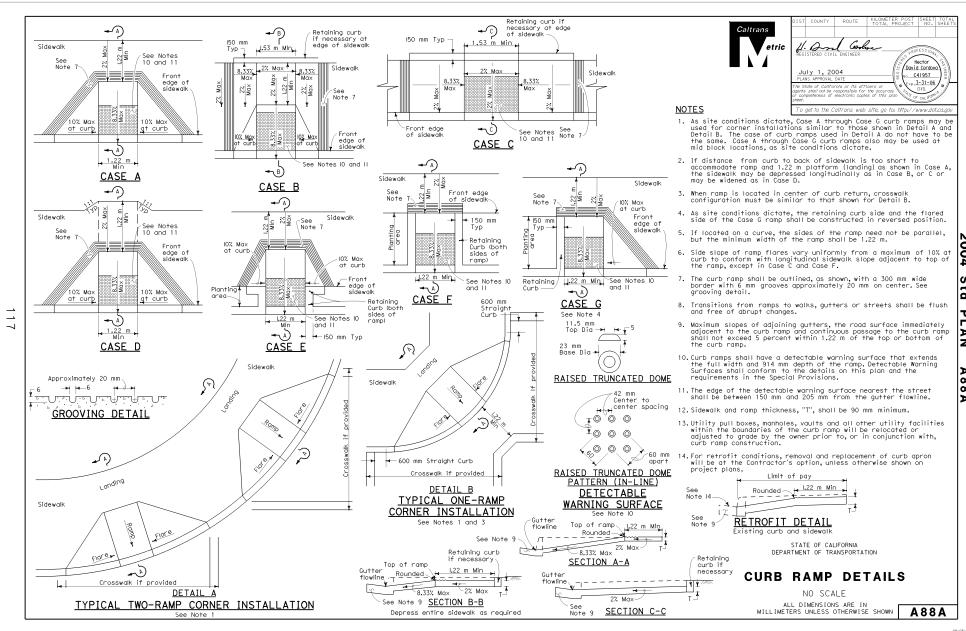
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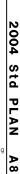
# **ASPHALT CONCRETE DIKES**

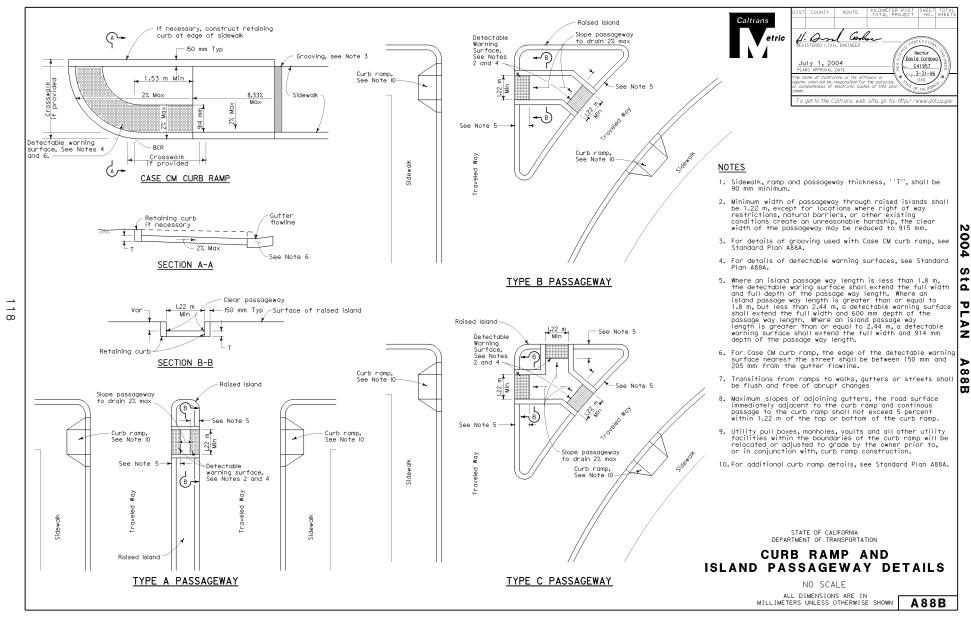
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

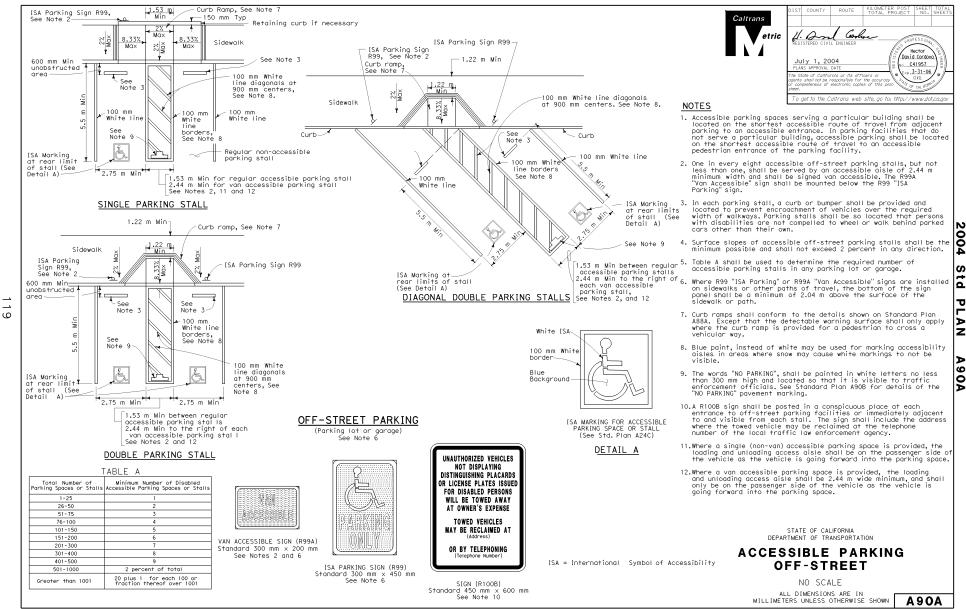
**A87B** 

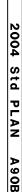








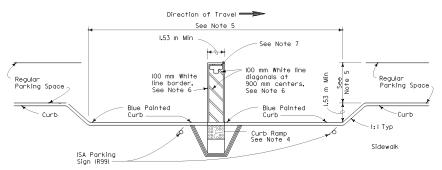






#### 1.53 m Min Direction of Travel See Note 7 See Note 5 1.53 m Min unobstructed area - 100 mm White line border See Note 6 Regular Parking Space Regular Parking Space 100 mm White line diagonals at - Curb 900 mm centers See Note 6 8.33% 8888 Max 8888 Curb Curb Ramp See Note Blue Painted Curb Sidewalk 300 mm → ISA Parkina

#### SINGLE PARKING SPACE



#### DOUBLE PARKING SPACE

### ON-STREET PARKING

(Parallel parking)



20



ISA PARKING SIGN (R99) Standard 300 mm × 450 mm See Note 3

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# ACCESSIBLE PARKING **ON-STREET**

NO SCALE

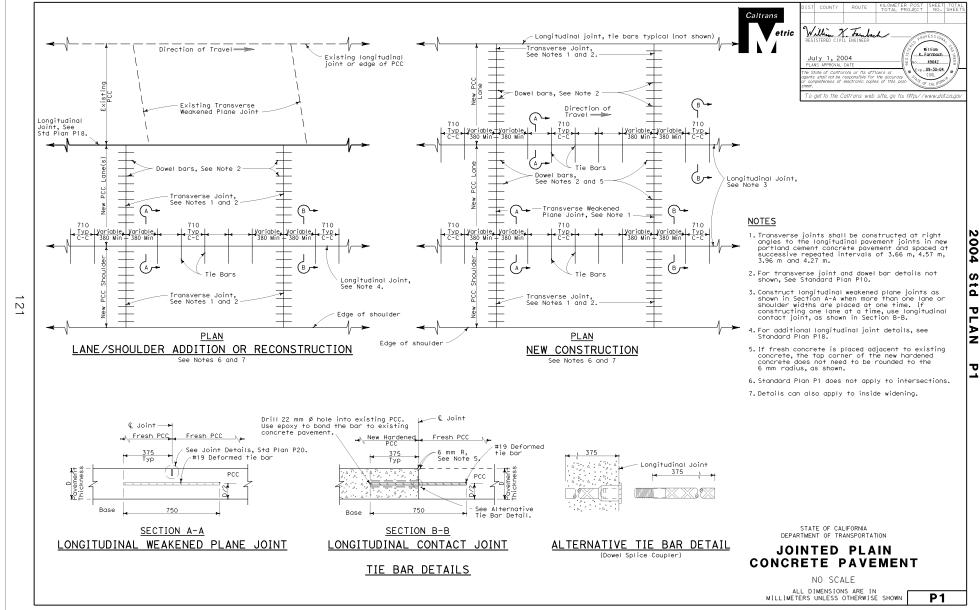
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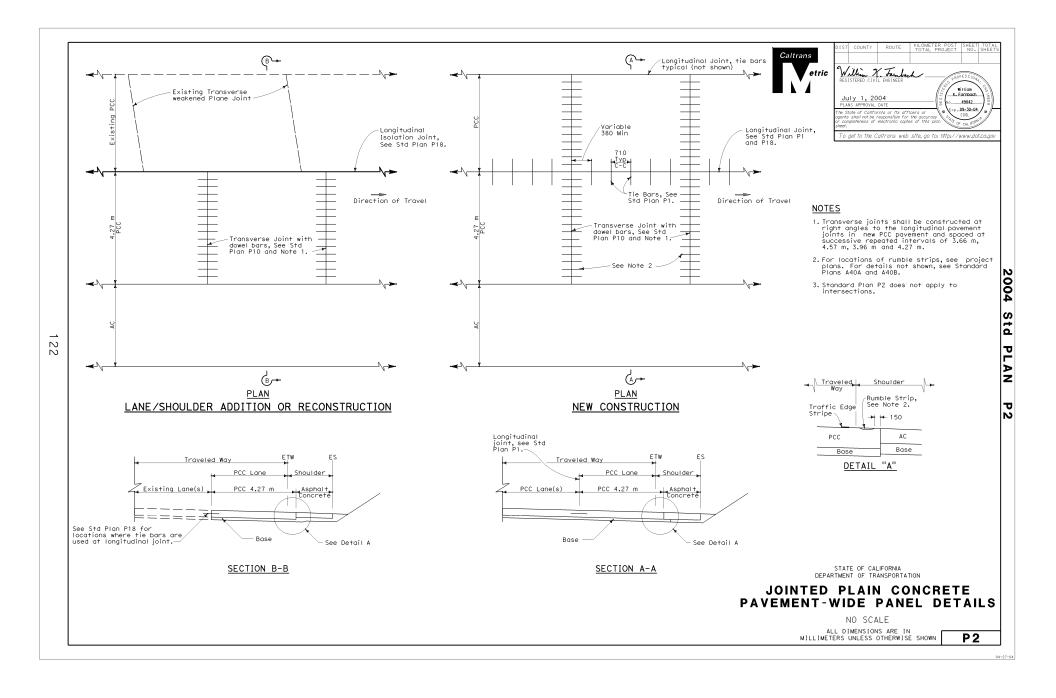
**A90B** 

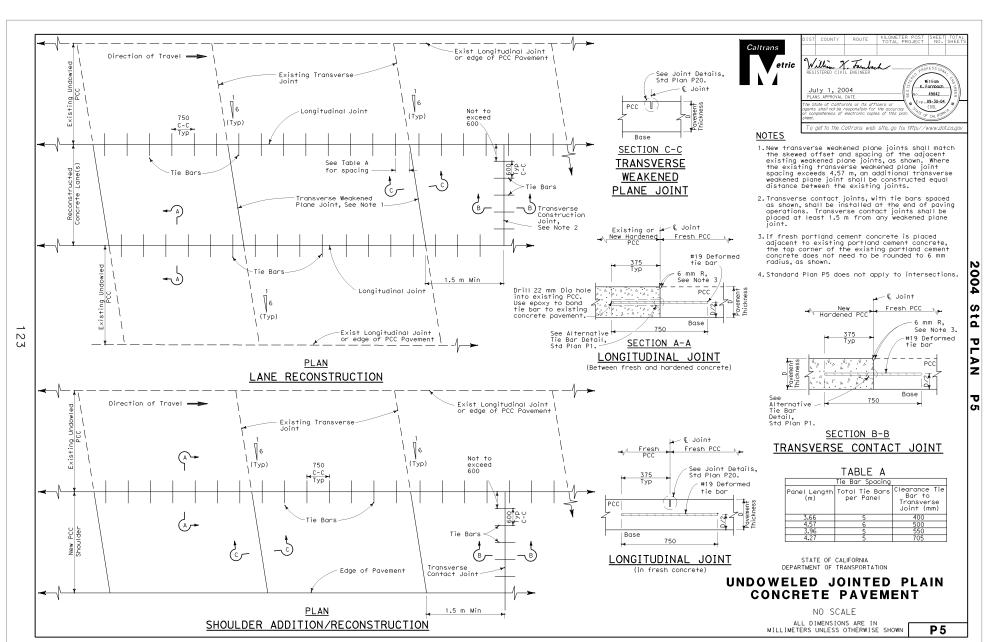
ISA = International Symbol of Accessibility

NOTES

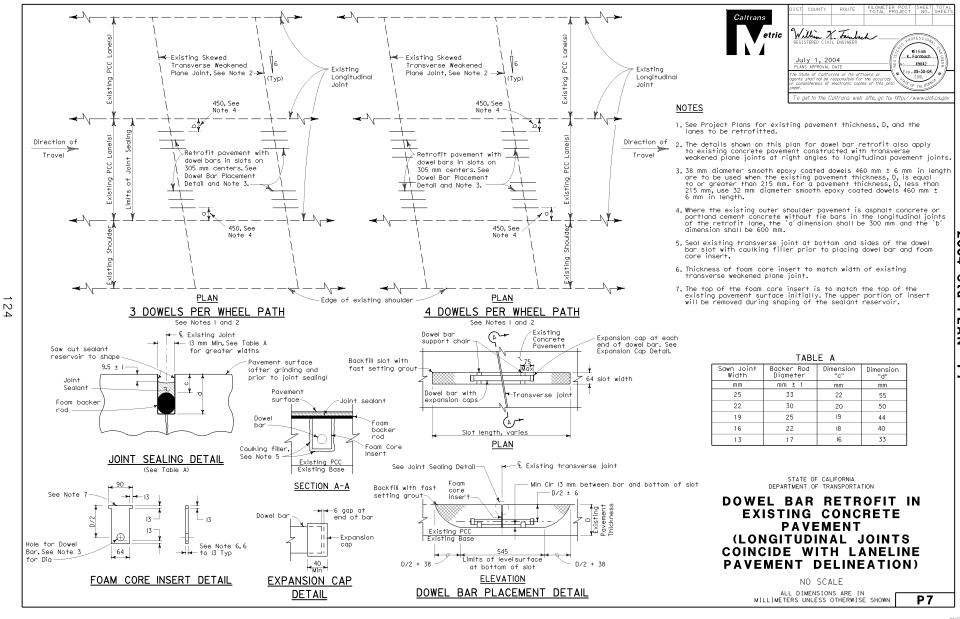
- Parking spaces shall be so located that persons with disabilities are not compelled to wheel or walk behind parked cars other than their own.
- Surface slopes of accessible on-street parking spaces shall be the minimum feasible.
- Where R99 "ISA Parking Signs" are installed on sidewalks or other paths of travel, the bottom of the sign panel shall be a minimum of 2.04 m above the surface of the sidewalk or path.
- 4. Curb ramps shall conform to the details shown on Standard
- 5. Accessible on-street parking spaces shall not be smaller in length or width than that specified by the local jurisdiction for other parking spaces.
- 6. Blue paint, instead of white may be used for marking accessibility aisles in areas where snow may cause white markings to not be visible.
- 7. The words "NO PARKING", shall be painted in white letters no less than 300 mm high on a contrasting background and located so that it is visible to traffic enforcement officials. See Standard Plan A24E for square meter area for painting the words "No PARKING".

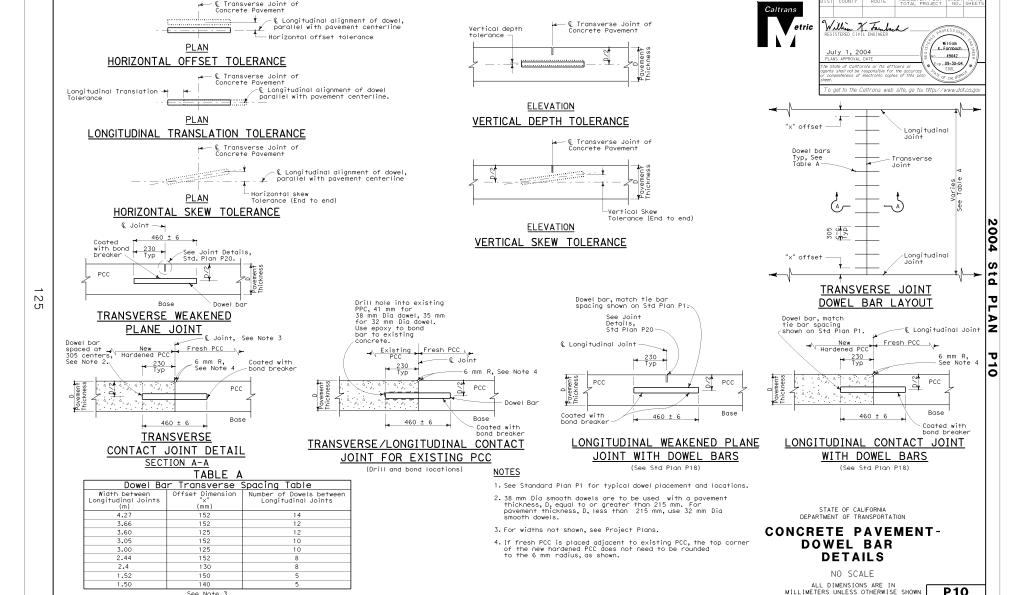






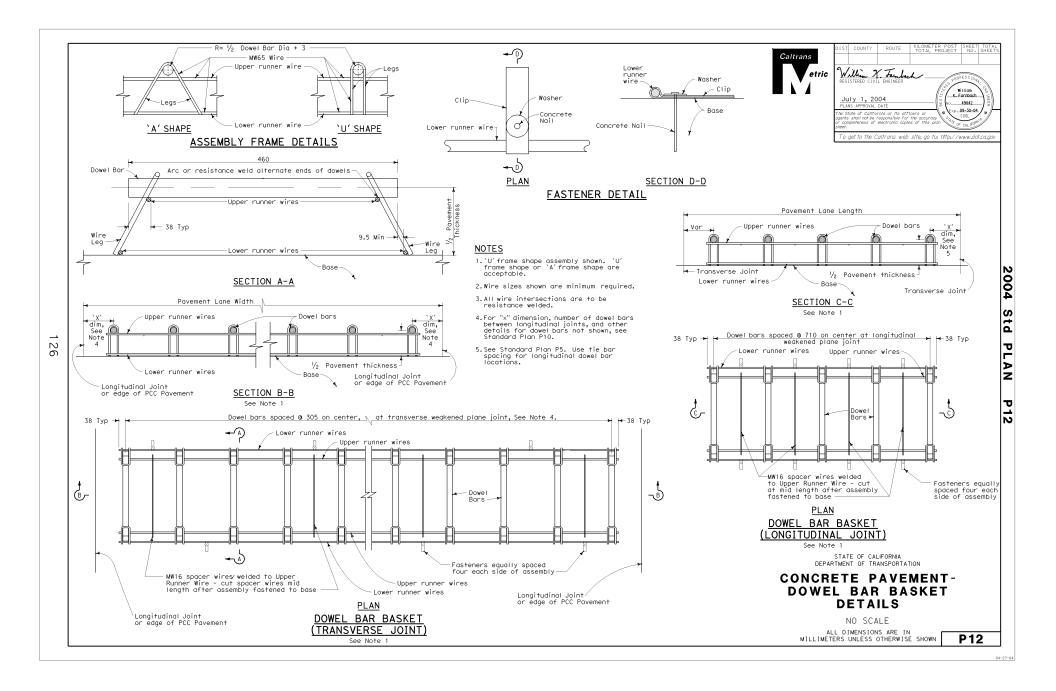


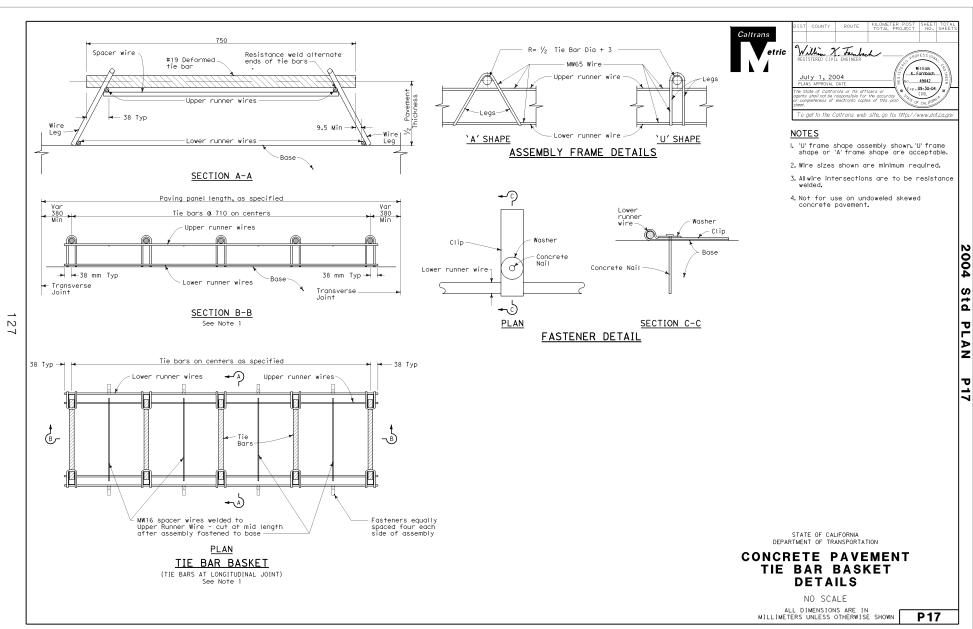


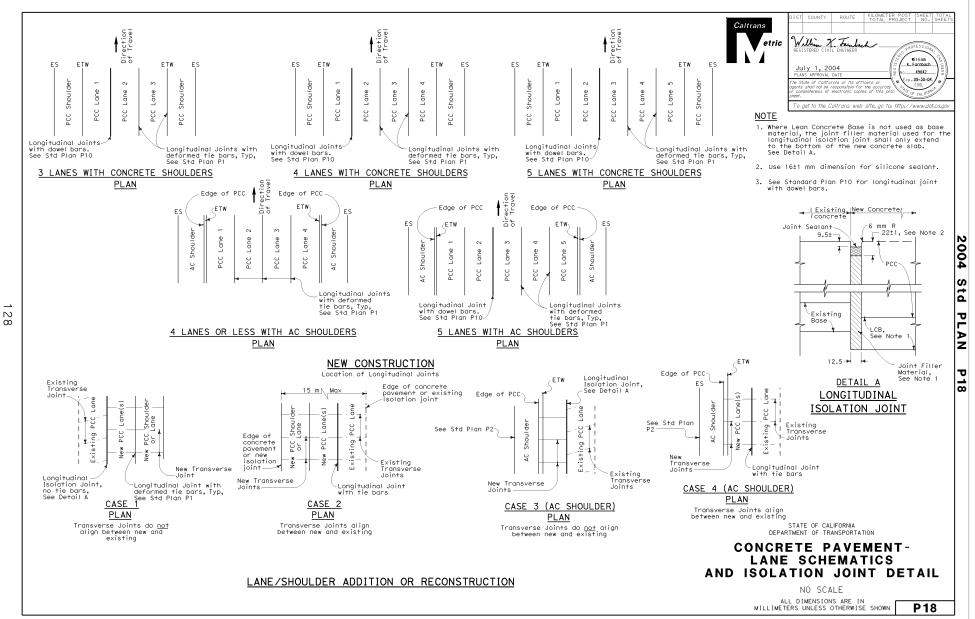


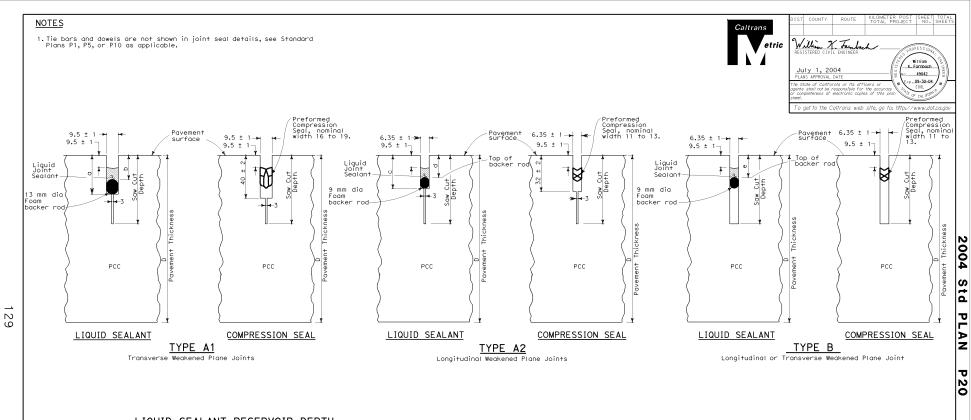
See Note 3

P10









### LIQUID SEALANT RESERVOIR DEPTH

LIQUID SEALANT	9.5 mm Jo			loint Width e A2	6.35 mm Joint Width Type B
MATERIAL	DIMEN	ISION	DIME	NSION	DIMENSION
	a	ь	С	d	e
SILCONE	26 ± 1	15 ± 1	23 ± 1	14 ± 1	14 ± 1
ASPHALT RUBBER	30 ± 1	19 ± 1	26 ± 1	17 ± 1	17 ± 1

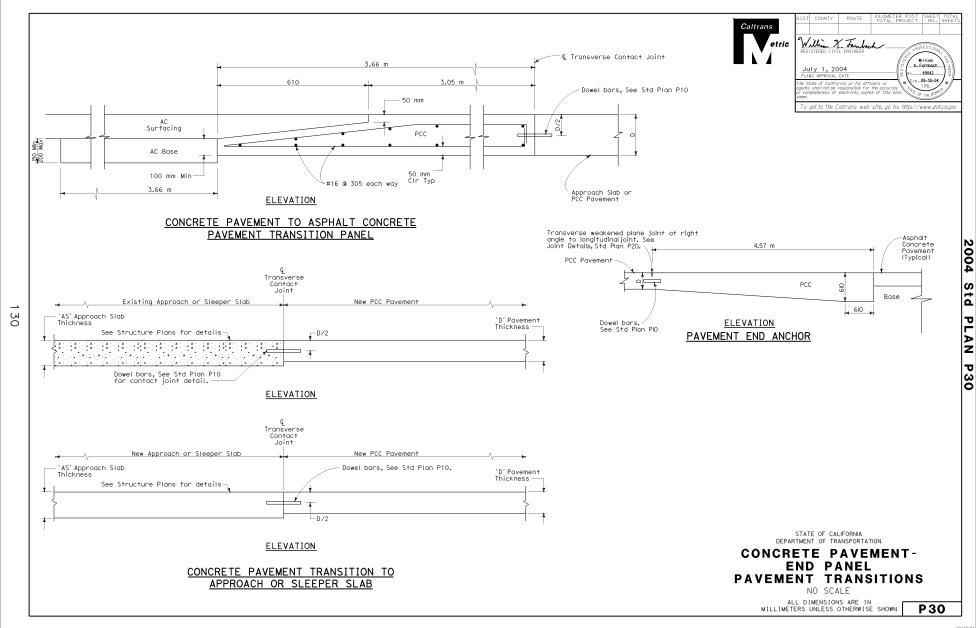
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

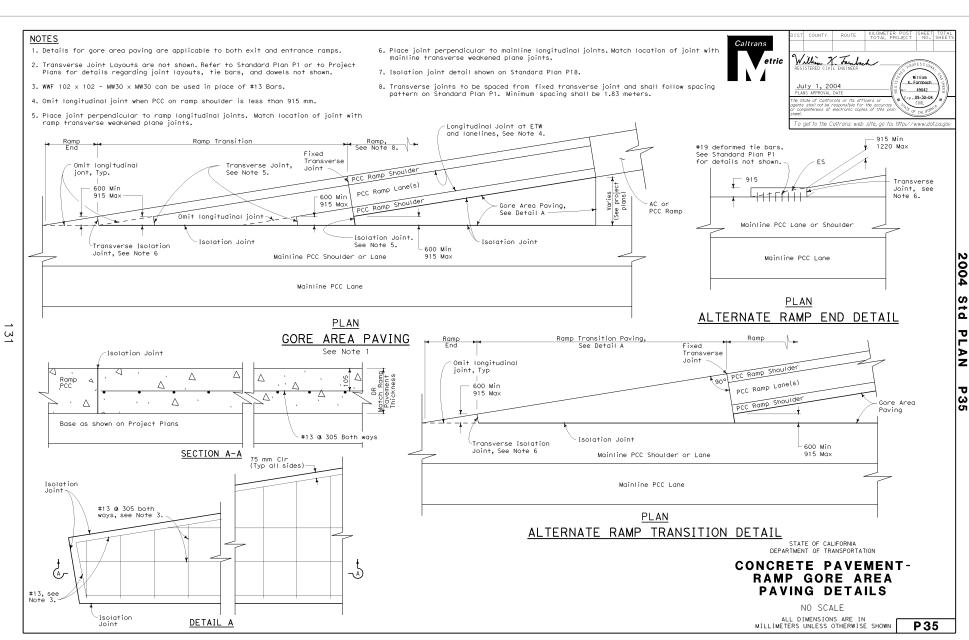
### CONCRETE PAVEMENT-JOINT DETAILS

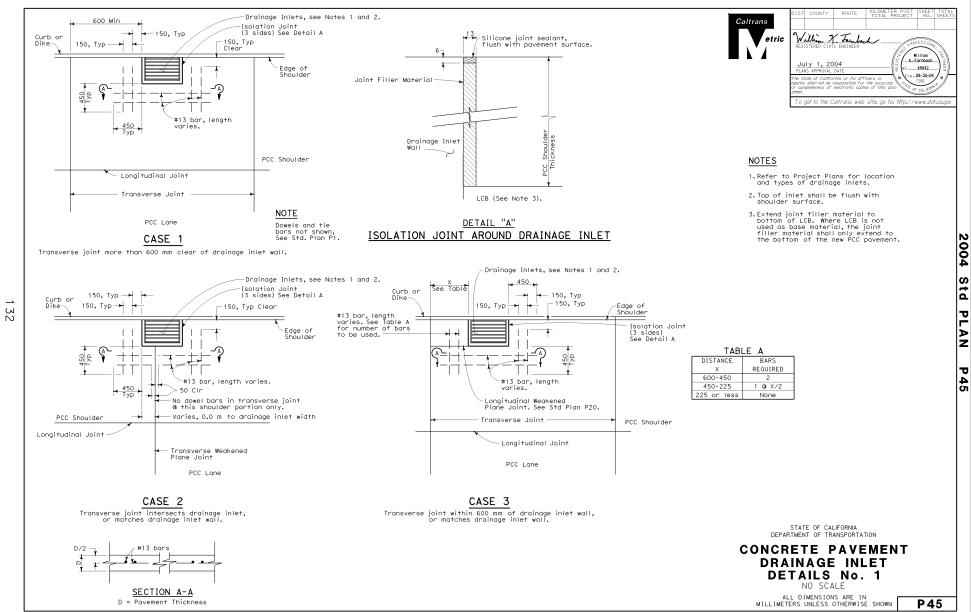
NO SCALE

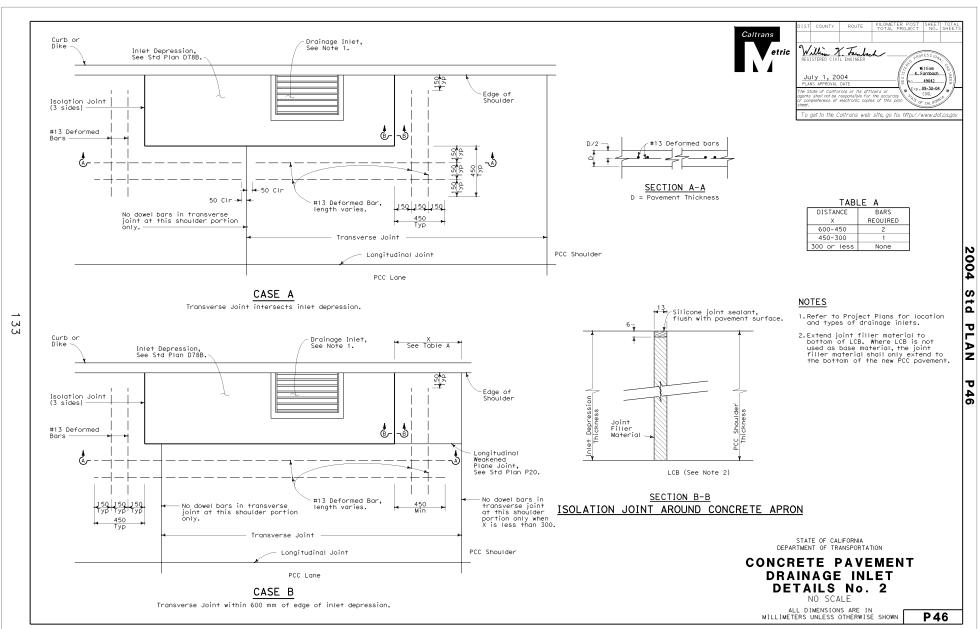
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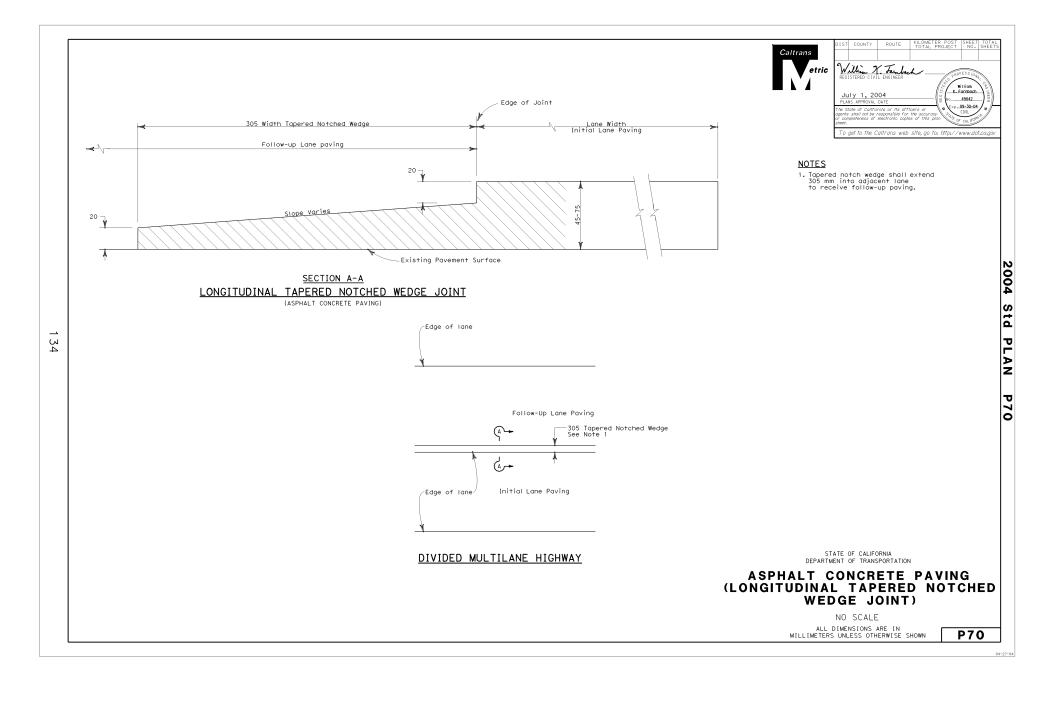
P20

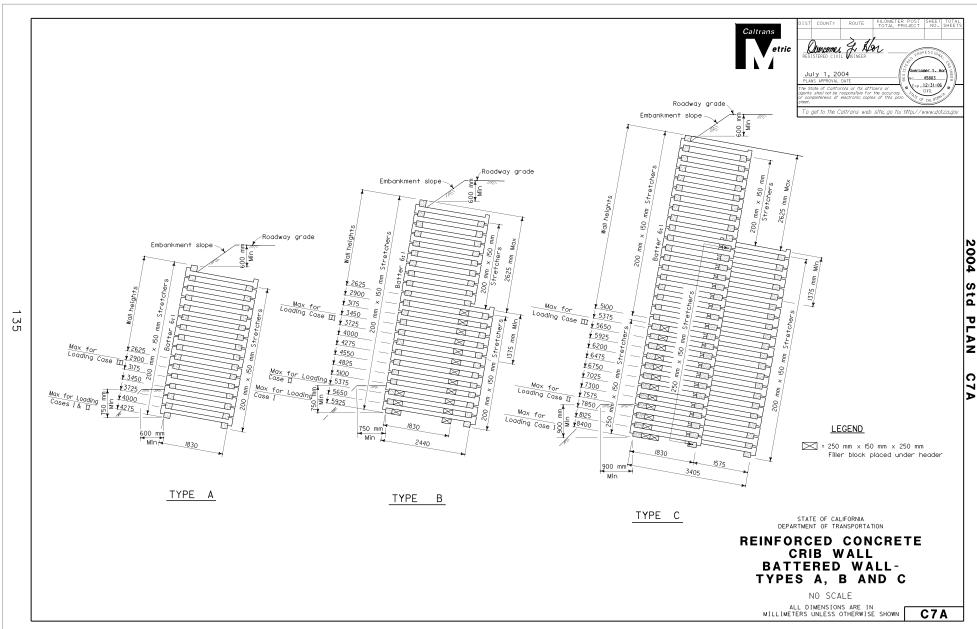


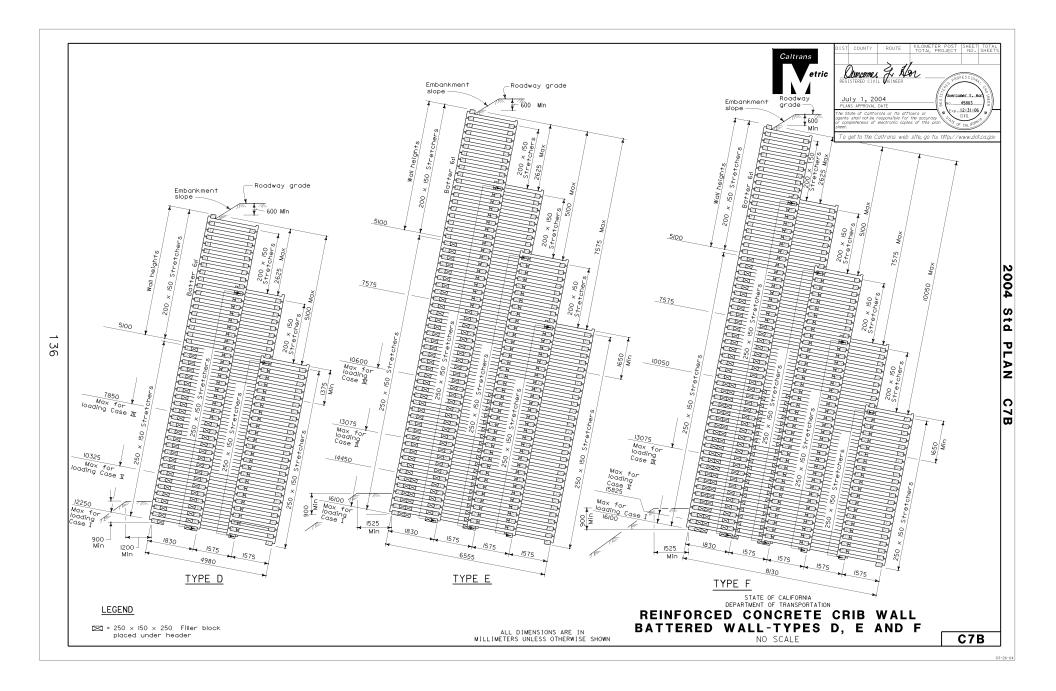


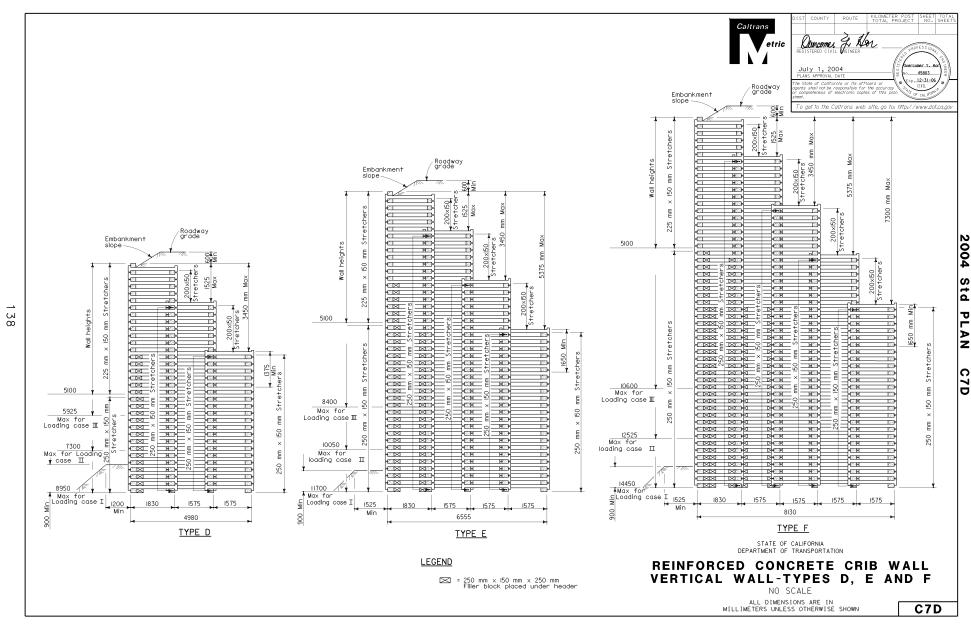




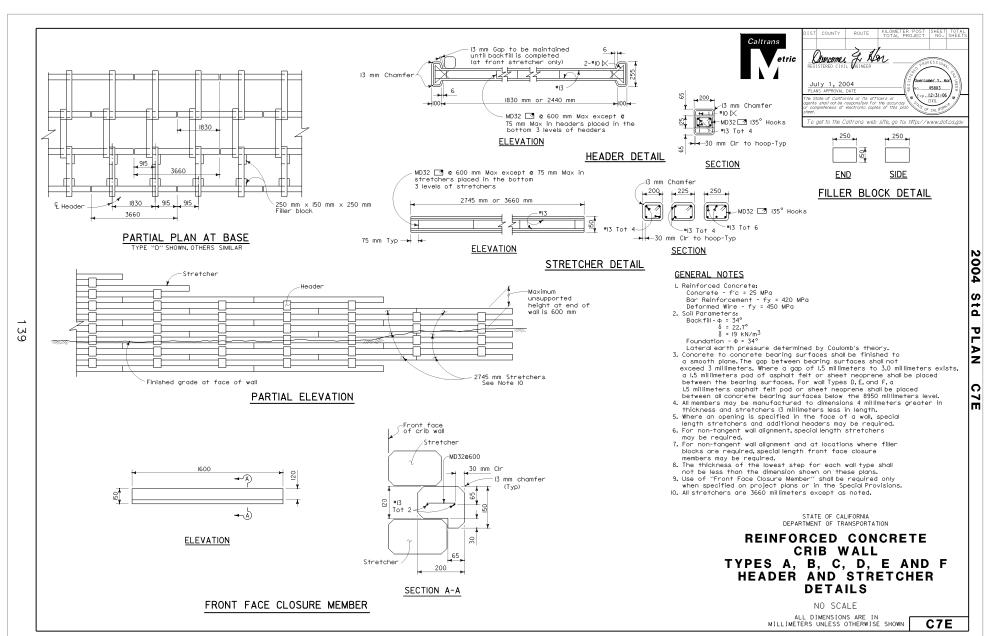








03-26-0



#### FOUNDATION PRESSURE-BATTERED WALL

														(K)	47															
TYPE	LOADING													WAL	L H	EIGHT	Г													
TIFE	CASE	425	700	975	1250	1525	1800	2075	2350	2625	2900	3175	3450	3725	4000	4275	4550	4825	5100	5375	5650	5925	6200	6475	6750	7025	7300	7575	7850	8125
Α	I II III	35* 40* 45*	40* 45* 50*	50* 50* 50*	55* 60* 55*	60* 65* 55*	65* 70* 65	70* 75* 80	70* 75* 100	70* 75* 125	75 75 <b>∗</b> 155 ∎	90 85	110 100	130 120	150 140	175 165														
В	III III									65 <del>*</del> 65 105	70 80 125	80 90 150	90 105 175	105 120	120 135	130 155	145 170	165 190	180 215	205 240 ■	225	250 ■								
С	I II III											75* 90* 110*	85 85 120	95 100 140	105 115 160	110 125 185	120 135 205	130 150 230	140 165 260	155 180 290 ■	165 195	180 215	195 230	210 250	225 270	245 295	265 320	285 345 ■	305	325
D	I II III																105 125* 180*	115 120* 165*	120 130 170	130 140 190	140 155 210	150 170 235	160 185 255	170 200 280	180 210 305	190 225 330	200 240 355	210 255 385	220 275 415	235 290
E	I II III																						140 170* 250*	145 165* 235*	155 170 220*	165 180 240	175 195 260	185 210 280	195 220 300	205 235 325
F	II II																													180 200* 290*

-	III																													290* 290*
		8400	8675	8950	9225	9500	9775	10050	10325	10600	10875	11150	11425	11700	11975	12250	12525	12800	13075	13350	13625	13900	14175	14450	14725	15000	15275	15550	15825	16100
Δ	I II III																													
В	I II III																													
С	I II III	350 ▮																												
D	I II III	245 310	260 325	270 345	285 365	300 385	315 410	330 430	350 455	365	385	405	425	445	470	490 ▮														
Ε	I II II	215 250 350	225 270 375	235 285 400	250 300 425	260 315 450	270 330 480	280 350 505	290 365 535	300 380 565	315 400	325 420	340 435	350 455	365 475	375 500	390 520	405 540	420 565∎	440	455	470	490	505	525	545	565	585	610	630∎
F	I II III	190 210 280*	200 225 290	210 235 310	220 250 330	230 265 350	240 280 375	250 290 395	260 305 420	270 320 445	280 340 470	290 355 495	305 370 520	315 390 545	325 405 575	335 420 600	345 435 630	355 455 660	365 470 690∎	380 490	390 510	400 525	415 545	425 565	440 585	455 610	470 630	480 650	495 675∎	510 ▮

- \*Indicates pressure at heel
- Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

#### DESIGN EXAMPLES

#### Example No.1:

В

С

D

Given: Wall height 6100 mm

1:2 cut slope to be retained. Foundation site investigation indicates lateral pressure from material above will be equivalent to design loading case II condition and an allowable soil bearing capacity of 240 kPa.

Select: Battered Type C or Type D wall. Actual H = 6200 mm. Type D vertical wall can be used by increasing the allowable bearing capacity of the original ground.

#### Example No. 2:

Given: Wall height 2750 mm

Design Loading Case I (600 mm level ground surcharge plus II.5 kPa of surcharge) to be retained. Base founded in embankment.

Select: Battered or vertical Type A or Type B wall. Actual H = 2900 mm.

#### Example No. 3:

Given: Wall beight 3050 mm

Design Loading Case III (I:1.5 embankment slope) to be retained. Base in original ground, sloping away from toe of wall at 1:2. Foundation investigation determines the allowable

soil bearing capacity is 190 kPa (considering the sloping ground in front of wall).

Select: Battered Type B or Type C wall or VerticalType C wall.
Actual H = 3175 mm

### Example No. 4:

Given: Wall height 9150 mm

Design Loading Case II (1:2 embankment slope) to be retained. Base in embankment (1525 mm depth minimum).

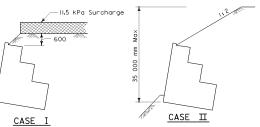
Select: Battered Type D.Type E or Type F wall or Vertical Type F wall. Actual H = 9225 mm. For all types the foundation pressure Is between 240 and 385 kPa. Embankment material below the wall must be

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35

CASE III

"Structure Backfill" (See Design Example Footnote I).



# DETAIL OF DESIGN LOADING CASES





#### DESIGN EXAMPLE FOOTNOTES

- I. To constitute a "wall base in embankment" condition, a minimum of 1525 mm of embankment at 95 percent relative compaction is required below the base of the wall. When the foundation pressure is between 240 and 385 kPa, the embankment below the wall shall be constructed with structure backfillmaterial to the limits specified for embankments constructed with relative compaction of 95 percent. The maximum allowable soil bearing capacity is 385 kPa.
- 2. For walls with "wall base in original ground" condition, the allowable soil bearing capacity, design lateral loads, and slope stability shall be determined by a foundation site investigation and by an analysis. Walls shall not be founded in original ground having an allowable soil bearing capacity of less than 145 kPa.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

### **DESIGN DATA FOR REINFORCED CONCRETE CRIB WALL** FOUNDATION PRESSURE-**BATTERED WALL**

NO SCALE

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### FOUNDATION PRESSURE - VERTICAL WALL

kPa

TVDE	LOADING														WALL H	HEIGHT														
TYPE	CASE	425	700	975	1250	1525	1800	2075	2350	2625	2900	3175	3450	3725	4000	4275	4550	4825	5100	5375	5650	5925	6200	6475	6750	7025	7300	7575	7850	8125
А	I II	25 <del>X</del> 25 <del>X</del> 30 <del>X</del>	30 30 30	× 30 → × 35 → × 40	40 40 60	50 50 80	65 65	80 85	100 105	120 125	145 155																			
В	II II						55 60 <del>X</del> 105 <del>X</del>	70 70 100	85 90 I30 ■	100 105	120 125	135 150	155 170 ∎	175 ■																
С	I II									80 85 <del>X</del> 140 <del>X</del>	95 95 130	105 110 150	II5 I25 I80	130 140 205	145 160 235	160 180 270 ■	175 200	195 225	210 250	230 275 ■	250	275	300 ■							
D	I II															130 135	145 155	155 175 240	170 190 270	180 210 295	195 225 325	205 245 360 ■	220 265	235 290	250 310	270 335	285 360	305 385 ∎	320	340
E	I II																			150 165 275 <del>X</del>	165 180 280 <del>X</del>	175 190 265	190 210 290	200 230 320	215 250 350	230 270 380	240 290 4I0	255 305 440	270 325 470	280 345 505
F	II II																											225 255 350	235 270 375	250 290 405

\*Indicates pressure at heel

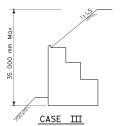
		8400	8675	8950	9225	9500	9775	10050	10325	10600	10875	11150	11425	11700	11975	12250	12525	12800	13075	13350	13625	13900	14175	14450
А	II I																							
В	II II																							
С	I II																							
D	II II	360	385	405 ■																				
E	II III	295 370 540 ∎	310 390	325 415	340 435	360 460	375 485	395 5I5 ∎	410	430	450	470	490	510										
F	II II I	260 310 430	275 330 460	290 350 490	300 370 520	315 385 555	330 405 585	340 425 620	355 450 655	370 470 690 ∎	385 490	400 515	415 540	430 565	450 590	465 615	480 640 ∎	500	520	535	555	575	595	615 ■

Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

II.5 kPa Surcharge

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XON EE OOO SE II



DETAIL OF DESIGN LOADING CASES

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

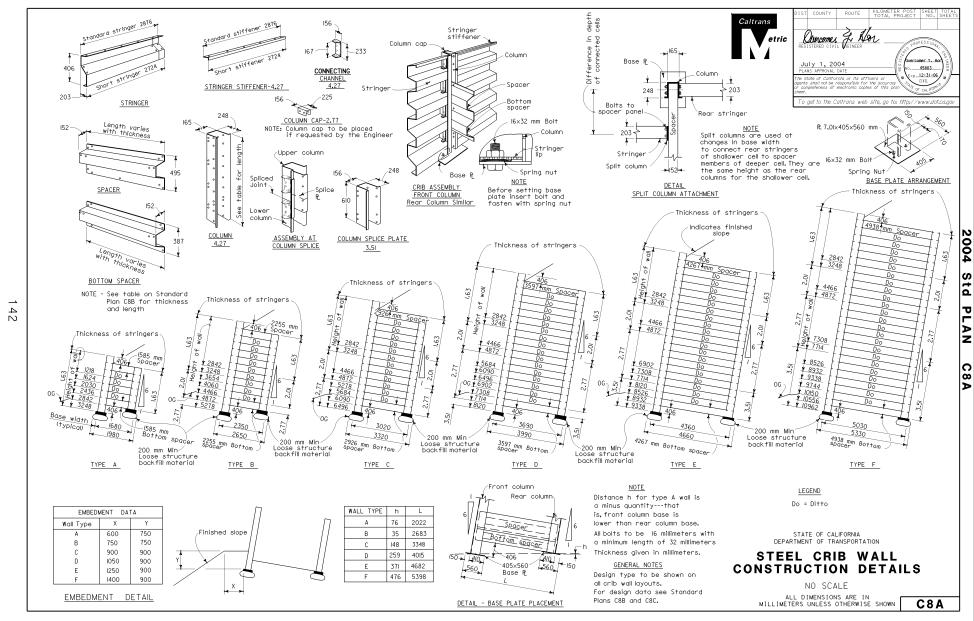
### REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE-VERTICAL WALL

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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NOTE

This table applies only to standard panel sections panel sections and includes stringer members for both front and rear of a 3050 millimeter length of wall.

				SP	∆CER	MFM	IBFR	S RF	QUIRE	n P	FR	TR	۵NS۱	VFR	SF	SEC	TION	J									STRIN	IGER	мЕмв	ERS
				51 /	TOLIN	1411114	IDEI	J 11L	COII (L			1111	7113	<b>V</b> L I V	<u> </u>	JLC	1101	<u>'</u>	_							ŀ	REQUI	RED I	PER C	ELL
WALL HEIGHT	BEARING PLATE	HEIGH	HT IN		ETERS	HEIGI	HT IN		ETERS	otal Column Length in Millimeters		Column Cap				& L	engt			hick	TOM ness	& L	engt				NGERS		St′r St′f	WALL HEIGHT
	405 500	ıst	2nd	3rd	Total Height	ıs†	2nd	3rd	Total Height	હિઁ≅	1 6	8	1.63	1.63	2.01	2.77	2.77	2.77	1.63	1.63	2.01	2.77	2.77	2.77	1.63	2.01	2.77	3.51		L
Millimeters			Lift	Liff			Liff	Liff			ن	١.	1585	2255	2926	3597	4267	4938	1585	2255	2926	3597	4267	4938		2896	2896	2896	2896	Millimeters
1218	2	1218			1218	406			406	1624		1							+						4					1218
1624	2	1624	_	-	1624	812			812	2436	-	H	-						-						6			-	+	1624
2030 2436	2 2	2030			2030	1218			1218	3248 4060	-	++	3	_					-	_	_				8	_		_	-	2030 2436
2842	2	2842			2842	2030			2030	4872		++	4						-						12				-	2842
3248	2	3248	-	-	3248	2436			2436	5684	-	H	5	5					+	-					14				+	3248
3654	2	3654			3654	2842			2842	6496	_	H	J	6				_		÷			_		14	2		_	÷	3654
4060	2	2436	1624		4060	3248			3248	7308	<u> </u>	H		7						÷					14	4			+	4060
4466	2	2436	2030		4466	3654			3654	8120	ΗĖ	l i		8	8					÷	-				14	6			-	4466
4872	2	2436	2436		4872	2436	1624		4060	8932	2	Τì		9	9					Ė	Ė				14	8			i	4872
5278	2	3654	1624		5278	2436			4466	9744	2	Ιì		10	10					Ť	ì				14	8	2		ì	5278
5684	2	3654	2030		5684	2436	2436		4872	10556	2	1			III	Ш					- 1	- 1			14	8	4		İ	5684
6090	2	3654	2436		6090	3654	1624		5278	11368	2	T			12	12					- 1	- 1			14	8	6		- 1	6090
6496	2	3654	2842		6496	3654	2030		5684	12180	2	- 1			13	13					_	- 1			14	8	8		- 1	6496
6902	2	3654	3248		6902	3654	2436		6090	12992	2	- 1				14	14					- 1	- 1		14	8	10		- 1	6902
7308	2	3654	3654		7308	3654	2842		6496	13804	2	1				15	15					- 1			14	8	12			7308
7714	2			1624	7714	3654			6902	14616	3	1				16	16						- 1		14	8	14		- 1	7714
8120	2	3654		2030	8120	3654	3654		7308	15428	3	1				17	17						- 1		14	8	14	2	- 1	8120
8526	2	3654		2436	8526	3654			7714	16240	4	1					18	18					- 1	-1	14	8	14	4	- 1	8526
8932	2	3654		1624	8932	3654		2030	8120	17052	4	1					19	19					- 1	- 1	14	8	14	6		8932
9338	2	3654		2030	9338	3654		2436	8526	17864							20	20					- 1	-	14	8	14	8		9338
9744	2	3654		2436	9744	3654		1624	8932	18676								21						1	14	8	14	10	- 1	9744
10150	2	3654		2842	10150	3654	3654		9338	19488	4	1	_					22							14	8	14	12		10150
10556	2	3654		3248	10556	3654		2436	9744	20300	4	1						23							14	8	14	14		10556
10962	2	3654	13654	3654	10962	3654	3654	2842	10150	21112	4							24							14	8	14	16		10962

This table applies only to short panel sections for curved walls and includes stringers for both front and rear of a 2896 millimeter length of wall.

| NACE | SHORT | STRINGERS | N FRONT | OF WALL | SHORT | STRINGERS | N FRONT | OF WALL | SHORT | STRINGERS | N FRONT | OF WALL | HEIGHT | L63 | 2.01 | 2.77 | 3.51 | St'd | Short| St'd

4

STRINGER MEMBERS REQUIRED PER CELL

2030 2436

10150

10556

NOTE

I. Use Graphs shown on Standard Plan C8C to determine the type of steel crib to use for the various surcharges on both vertical and batter walls.

2. For non-tangent wall alignment, special length stringers may be required.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

### STEEL CRIB WALL DESIGN DATA

NO SCALE

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#### **DESIGN NOTES**

- I. Wall base in embankment: A minimum depth of 1500 millimeters of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 240 and 400 kPa, embankment below the wall shall consist of "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.
- 2. Wall base in original ground: Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded in original ground having an allowable bearing capacity of less than 145 kPa. Consideration should be given to removal and replacement of unsuitable material with "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.

#### Drainage:

- a. Internal: Section 19-3.06 of the Standard Specifications.
- b. External: If the combined height of wall and overfill (measured glong face of wall and vertically from the toe of fill to top of fill) exceeds 7600 millimeters a system to drain water away from the back face of wall shall be provided. The type and extent of this system will depend on the type of backfill material expected to be used, the combined height of wall and backfill, and the location of the water table in the area.
- 4. Sloping Surcharge Limitations: The maximum height of fill behind any wall.or family of walls, shall not exceed 35 meters (measured vertically from the toe of th bottom wall to the top of fill behind the uppermost wall). For a family of walls the slope of a line drawn from the top of the front face of the bottom wall to the top of the front face of any intermediate or top wall, shall in no case be steeper than I:1.5.

#### Material Specifications: Steel sheets:

AASHTO M218 310 275 kPa Ultimate 227 535 kPa Yield @ 20% Elongation Bolts: ASTM A307 Grade A

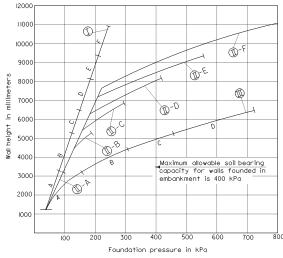
> STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

### STEEL CRIB WALL DESIGN DATA

NO SCALE

ALL DIMENSIONS ARE IN MILLIMFTERS UNLESS OTHERWISE SHOWN

C8C



# 6 : I BATTERED WALL

0

10000

9000

8000

7000

6000

5000

4000

3000

2000

1000

### DESIGN EXAMPLES

#### EXAMPLE NO. I

4

 $\Delta$ 

Given: Wall height 7300 millimeters.

Design loading Case II.

35 meters maximum from toe of wall to top of slope. Base in embankment (ISOO millimeters depth minimum).

Select: 6:1 Battered wall. Vertical wall not permitted. Type D wall selected.

Maximum height on graph is 8050 millimeters at 400 kPa. Since the foundation pressure is 305 kPa at 7300 millimeters, the wall must be founded on a 1500 millimeters - Upper end of line indicates maximum wall height for a given thickness of "Structure Backfill" (See Design Note I).

A drainage system behind this wall will be required.

#### EXAMPLE NO. 2

Given: Wall height 8800 millimeters.

Design loading Case II. Foundation site investigation indicates lateral pressure from material above will be equivalent to 1:2 embankment slope. Base in excavation level at toe of wall. Foundation investigation determines the allowable soil bearing capacity at 300 kPa.

Select: Battered Type F wall maximum height at 400 kPa is 9000 millimeters, therefore the replacement of 1500 millimeters of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa is required (See Design Note I). A drainage system for this wall should be investigated.

#### EXAMPLE NO. 3

Given: Wall height 4600 millimeters.

Design loading Case III with overall height less than 35 millimeters. Base on original ground. Foundation investigation determines allowable soil bearing capacity at 200 kPa.

Select: Use a Type C Battered Wall However foundation pressure exceeds 200 kPa. therefore the replacement of 1500 millimeters of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa is required (See Design Note I).

## LEGEND FOR GRAPHS

A, B, C, D, E, F = Wall Type (I) (III) = Loading Case

- For description of loading case, see detail of design loading cases.

J-F

(II)

Maximum allowable soil bearing

capacity for walls founded in

embankment is 400 kPa

(II)

D-E

400

Foundation pressure in kPa

VERTICAL WALL

Q

8

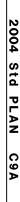


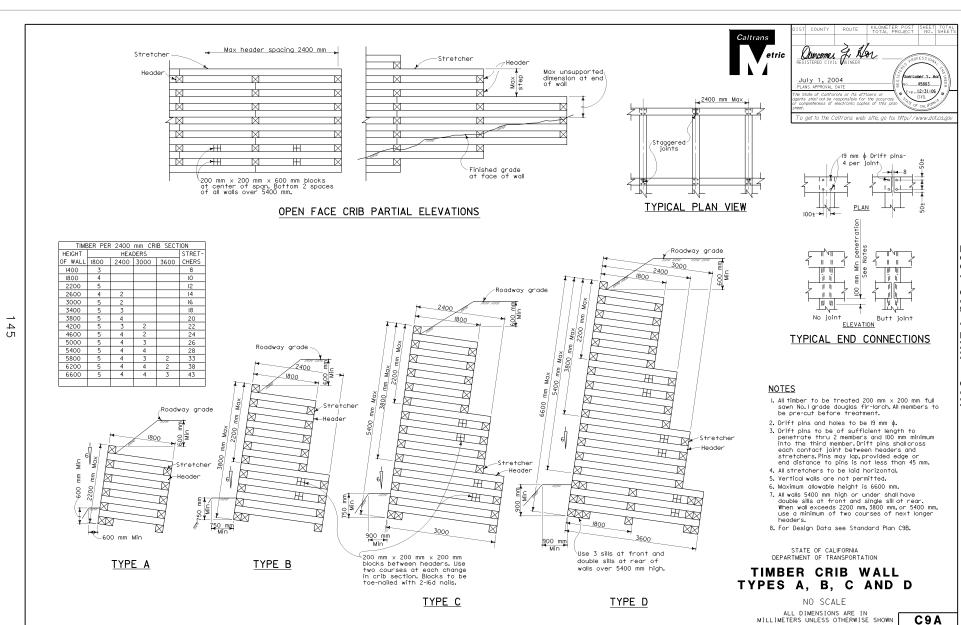
### DETAIL OF DESIGN LOADING CASES

Note: Similar loading cases for vertical wall.

### NOTE

For construction details see Sheet C8A.





STATE OF CALIFORNIA

ROUTE KILOMETER POST TOTAL PROJECT

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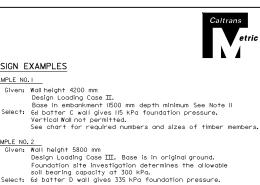
July 1, 2004

### TIMBER CRIB WALL TYPES A, B, C AND D DESIGN DATA

DEPARTMENT OF TRANSPORTATION

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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## EXAMPLE NO. 2

EXAMPLE NO. I

DESIGN EXAMPLES

Given: Wall height 5800 mm

Given: Wall height 4200 mm

Design Loading Case III. Base is in original ground. Foundation site investigation determines the allowable soil bearing capacity at 300 kPa.

Select: 6:1 batter D wall gives 335 kPa foundation pressure. Vertical wall not permitted. Since foundation pressure is greater than allowable bearing capacity of native material, replace original material with "Structure backfill" to increase base bearing capacity. (See Note 2)

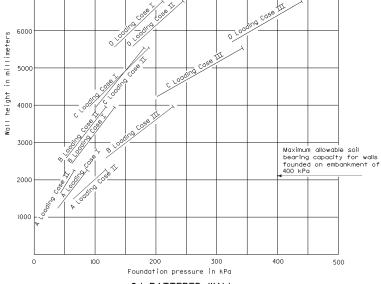
#### EXAMPLE NO. 3

Given: Wall height 6600 mm

Design Loading Case II. Base is in embankment. (See Note I)

Select: 6:1 batter D wall gives 230 kPa foundation pressure. Vertical wall not permitted. Foundation pressure is

less than 240 kPa. Base material below wall shall be compacted to a relative compaction of 95%. (See Note I).



### 6:I BATTERED WALL

#### LEGEND FOR GRAPH

- . A, B, C, D = Wall type.
- . Solid lines indicate normal range of wall use. Upper end of line indicates maximum wall height for a given wall type and loading.
- . For description of loading case see DETAIL OF DESIGN LOADING CASES.

#### DESIGN NOTES

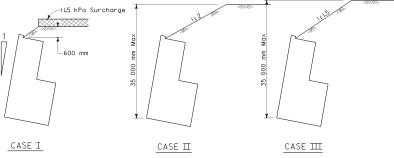
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8000

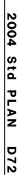
7000

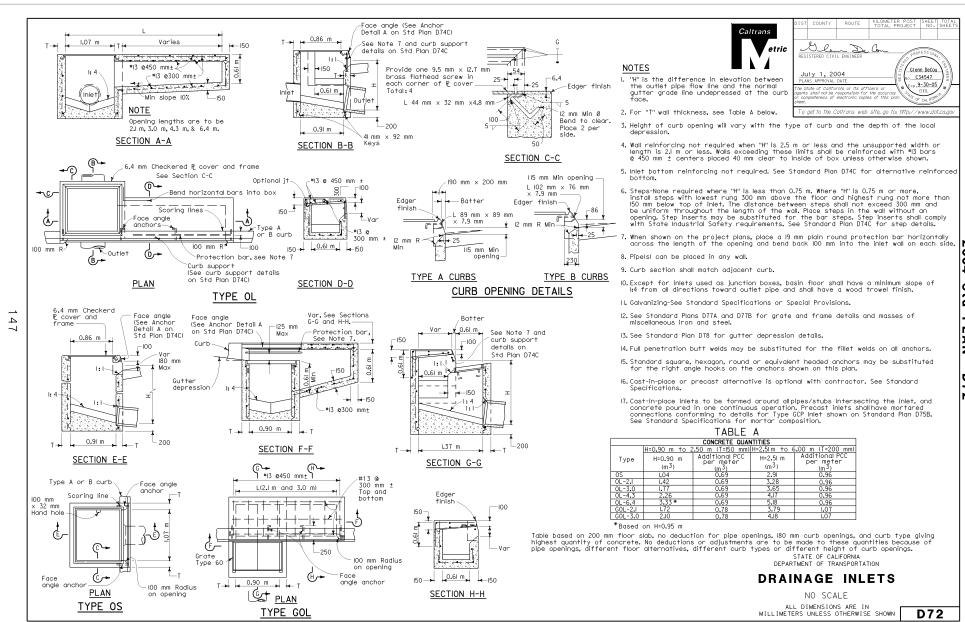
- I. WALL BASE IN EMBANKMENT: A minimum depth of 1500 mm of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 240 kPa and 400 kPa embankment below the wall shall consist of "Structure backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95%) shall be as set forth in Section 19-5.03 of the Standard Specifications.
- WALL BASE IN ORIGINAL GROUND: Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded in original ground having an allowable bearing capacity of less than I45 kPa.

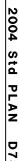
  Consideration should be given to removal and replacement of unsuitable material with "Structure backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95%) shall be as set forth in Section 19-5.03 of the Standard Specifications.
- 3. Soil Parameters: Foundation - ø = 34° Lateral earth pressure determined by Rankine Theory.

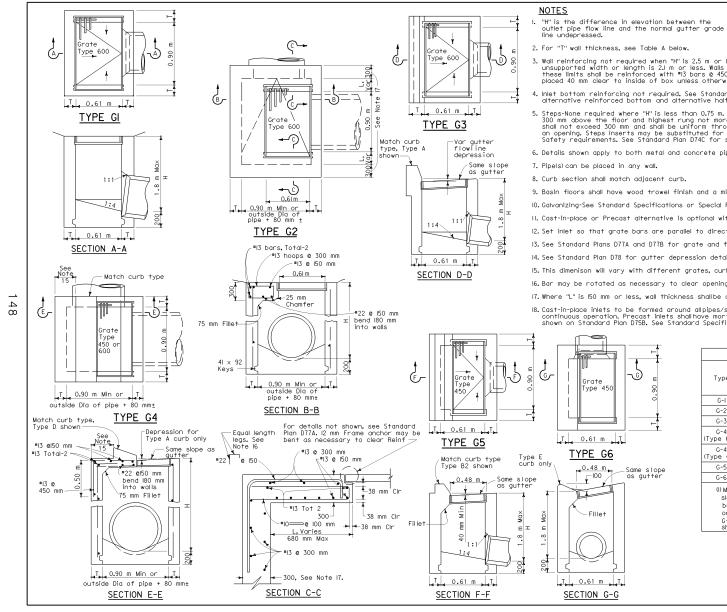


DETAIL OF DESIGN LOADING CASES









## Caltrans

Wall reinforcing not required when "H" is 2.5 m or less and the unsupported width or length is 2.1 m or less. Walls exceeding these limits shall be reinforced with #13 bars @ 450 mm ± centers placed 40 mm clear to inside of box unless otherwise shown.

4. Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom and alternative half round bottom.

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5. Steps-None required where "H" is less than 0.75 m. Where "H" is 0.75 m or more, install steps with lowest rung 300 mm above the floor and highest rung not more than 150 mm below top of inlet. The distance between steps shall not exceed 300 mm and shall be uniform throughout the length of the wall. Place steps in the wall without an opening. Steps inserts may be substituted for the bar steps. Step inserts shall comply with State Industrial Safety requirements. See Standard Plan D74C for step details.

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- 6. Details shown apply to both metal and concrete pipe.
- 9. Basin floors shall have wood trowel finish and a minimum slope of 1:4 from all directions toward outlet pipe.
- 10. Galvanizing-See Standard Specifications or Special Provisions.
- II. Cast-in-place or Precast alternative is optional with contractor, See Standard Specifications.
- 12. Set inlet so that grate bars are parallel to direction of principal surface flow.
- 13. See Standard Plans D77A and D77B for grate and frame details and masses of miscellaneous iron and steel.
- 14. See Standard Plan D78 for gutter depression details.
- 15. This dimenison will vary with different grates, curbs types, box width and wall thickness,
- 16. Bar may be rotated as necessary to clear opening. Where "L" is 150 mm or less, bar may be omitted.
- 17. Where "L" is 150 mm or less, wall thickness shallbe as shown in Table A.
- 18. Cast-in-place inlets to be formed around allpipes/stubs intersecting the inlet, and concrete poured in one continuous operation. Precast inlets shall have mortared connections conforming to details for Type GCP inlet shown on Standard Plan DTSB. See Standard Specifications for mortar composition.

#### TABLE A

		CONCRETE QUAN	ITITIES	
	H=0.90 m	to 2.50 m (T=150 mm)	H=2.51 m 1	o 6.00 m (T=200 mm)
Туре	H=0.90 m (m3)	Additional PCC per meter (m3)	H=2.51 m (m3)	Additional PCC per meter (m3)
G-I	0.69	0.55	(1)	(1)
G-2*	1.01	0.63	3.32	1.14
G-3	0.75	0.55	(1)	(1)
G-4* (Type 600)	0.93	0.63	2.67	0.88
G-4* (Type 450)	0.95	0.63	2.69	0.88
G-5	0.75	0.55	(1)	(1)
G-6	0.76	0.55	(D)	(1)

(1) Maximum allowable height 1.8 m. Table based on 200 mm floor slab. No deductions are to be made to these quantities because of pipe openings, different floor alternatives or different curb types. \* Quantities for Type G-2 and G-4 inlets based on the minimum interior dimensions shown.

> STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

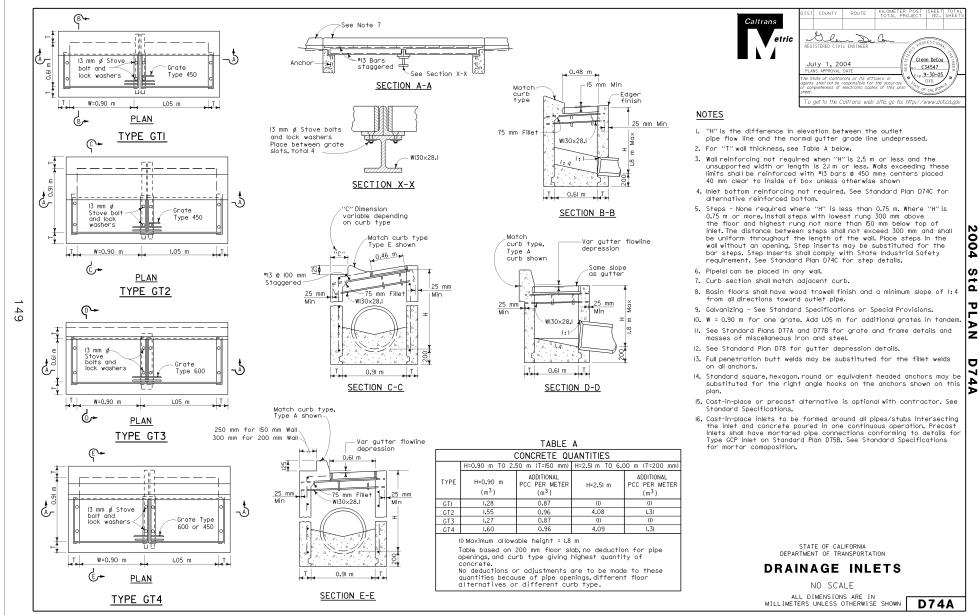
### DRAINAGE INLETS

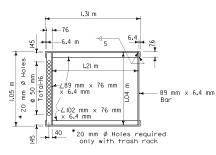
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

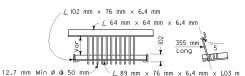
**D73** 







### GRATE FRAME FOR TYPE GDO INLET



TRASH RACK (For use with pump installation)

#### TABLE B

as required

CURB TYPE	NORMAL CURB HEIGHT	CURB BATTER	``a'' DIMENSION	"b" DIMENSION
A-I50	150	40	T+190	T+I60
A-200	200	50	T+I80	T+I50
В	150	100	T+I30	T+I00
"A" Dîke	150	75	T+I55	T+I25

#### TABLE A

	CON	ICRETE QU	ANTITIES	
	H=0.90 m TO 2.	50 m (T=150 mm)	H=2.51m TO 6.	00 m (T=200 mm)
TYPE	H=0.90 m (m <sup>3</sup> )	ADDITIONAL PCC PER METER (m <sup>3</sup> )	H=2.51 m (m <sup>3</sup> )	ADDITIONAL PCC PER METER (m <sup>3</sup> )
GO	0.91	0.61	2.57	0.86
GDO	1.21	0.80	3.33	1.11

Table based on 200 mm floor slab, no deduction for pipe openings, and curb type giving highest quantity of concrete. No deductions or adjustments are to be made to these quantities because of pipe openings, different floor alternatives or different curb type.



	DIST	COUNTY	ROUTE		TER POST PROJECT	SHEET NO.	TOTAL
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#### NOTES

- I. "H" is the difference in elevation between the outlet pipe flow line and the normal gutter grade line undepressed.
- 2. For "T" wall thickness, see Table A below.
- 3. Wall reinforcing not required when "H" is 2.5 m or less and the unsupported width or length is 2.1 m or less. Walls exceeding these limits shall be reinforced with #13 bars @ 450 mm+ centers placed 40 mm clear to inside of box unless otherwise shown.
- 4. Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom.
- 5. Steps None required where "H" is less than 0.75 m. Where "H" is 0.75 m or more, install steps with lowest rung 300 mm above the floor and highest rung not more than 150 mm below top of inlet. The distance between steps shall not exceed 300 mm and shall be uniform throughout the length of the wall. Place steps in the wall without an opening. Step inserts may be substituted for the bar steps. Step Inserts shall comply with State Industrial Safety requirements. See Standard Plan D74C for step details.
- 6. When shown on the project plans, place a 19 mm plain round protection bar horizontally across the length of the opening and bend back 100 mm into the inlet wall on each side.
- 7. Pipe(s) can be placed in any wall.
- 8. Curb section shall match adjacent curb.
- 9. Basin floors shall have wood trowel finish and shall slope toward the outlet pipe as shown.
- 10. Galvanizing See Standard Specifications or Special Provisions.
- II. See Standard Plan D77A and D77B for grate and frame details and masses of miscellaneous iron and Steel.
- 12. See Standard Plan D78 for gutter depression details.
- 13. Full penetration butt welds may be substituted for the fillet welds on all anchors.
- 14. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
- 15. Cast-in-place or precast alternative is optional with contractor. See Standard Specifications.
- 16. Cast-in-place inlets to be formed around all pipes/stubs intersecing the inlet and concrete poured in one continuous operation. Precast inlets shall have mortared pipe connections conforming to details for Type GCP inlets on Standard Plan D75B. See Standard Specifications for mortar composition.

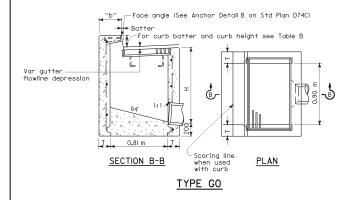
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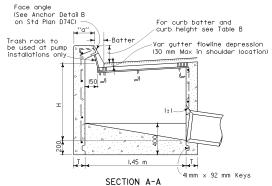
### DRAINAGE INLETS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

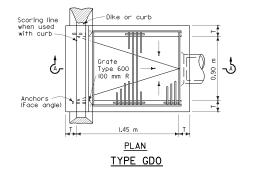
**D74B** 



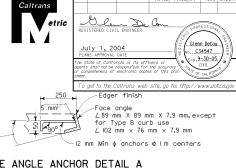


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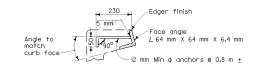






### FACE ANGLE ANCHOR DETAIL A

FACE ANGLE I	DETAIL A				
Length of Curb Opening	No of Anchors				
I.I m or Less	2				
2.1 m	3				
3.0 m	4				
4.3 m	5				
6.4 m	7				



### FACE ANGLE ANCHOR DETAIL B

### NOTES

Angle to match

curb face

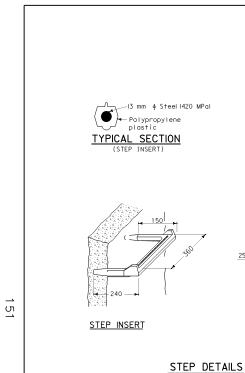
- When shown on the project plans, place a 19 mm plain round protection bar horizontally across length of the opening and bend back 100 mm into the inlet wall on each side.
- 2. Curb supports shall be evenly spaced and minimal in number such that maximum span of unsupported



### DRAINAGE INLET DETAILS

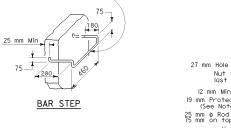
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

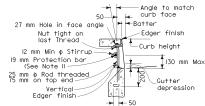
D74C



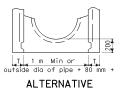


19 mm Min φ Galv Steel step or 25 mm Min φ Steel step

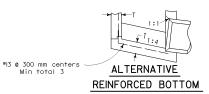




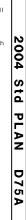
### **CURB SUPPORT DETAIL** See Note 2

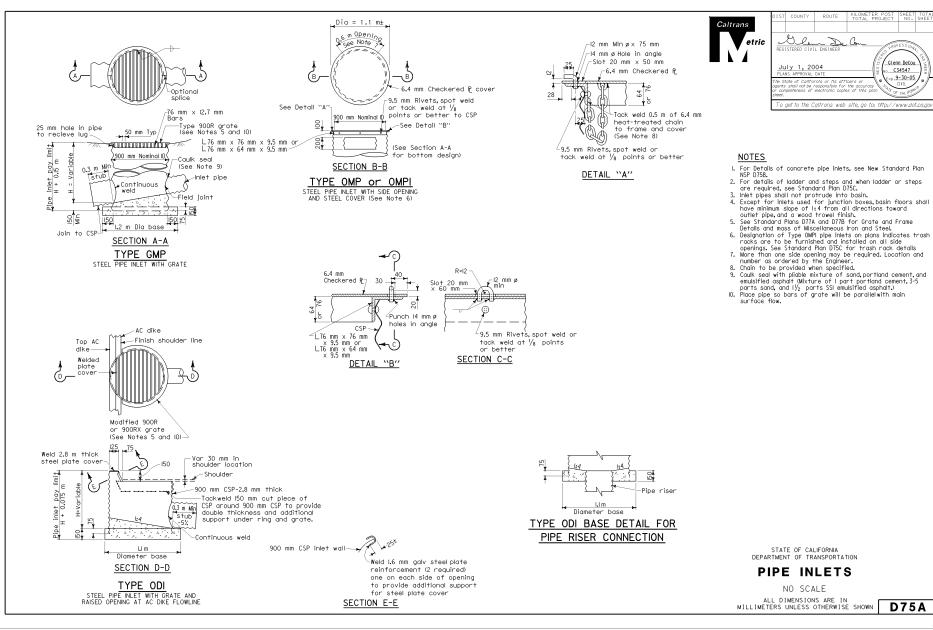


**ALTERNATIVE** HALF ROUND BOTTOM



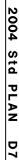
NO SCALE



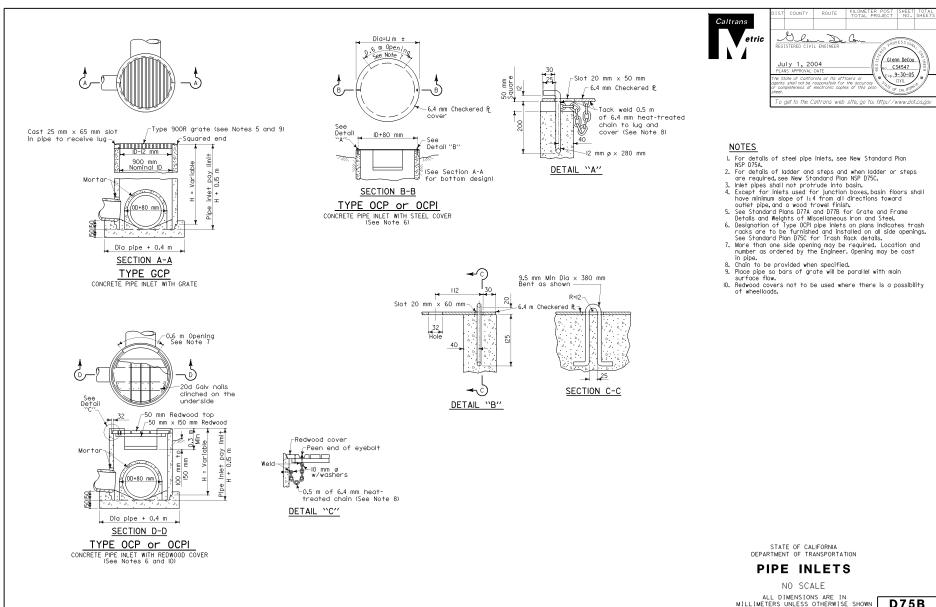


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**D75B** 

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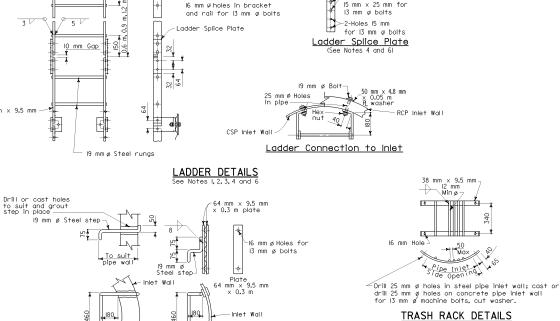
#### NOTES

- 1. Ladders and Steps None required where "H" dimension of pipe inlet is less than 0.75 m. Where "H" is 0.75 m or more, install steps or ladder with lowest rung not more than 0.3 m above the floor and highest rung not more than 0.3 m below top of inlet. The distance between steps or rungs shall not exceed 0.3 m and shall be uniform throughout the length of the wall. Place steps or ladder in the wall without an
- opening.

  2. Ladder may be constructed in one length at contractor's option on RCP inlet.

  3. On CSP inlet, connect ladder splice plate so joint
- can compress 10 mm.

  4. Ladder splice plate to be connected with 13 mm ø bolts with double nuts.
- Trash racks used on Type OCPI and OMPI inlets. Trash racks required for pumping installations.
- All hardware to be galvanized after fabrication. See Standard Specifications or Special Provisions.



-64 mm × 9.5 mm × 0.25 m

(See Notes 5 and 6)

-2-Holes slotted

150 mm × 6.4 mm × 0.15 m P with 22 mm øhole

-Brackets @ 3 m ctrs max 115 mm  $\times$  6.4 m bent plate

Grind all exposed corners 5 mm radius.

⊢22 mm ø Hole

in bracket

0.4 m Min

3 V

64 mm  $\times$  9.5 mm - Rails

 $\mathcal{O}$ 

0.3

RCP INLET

CSP INLET

STEP DETAILS

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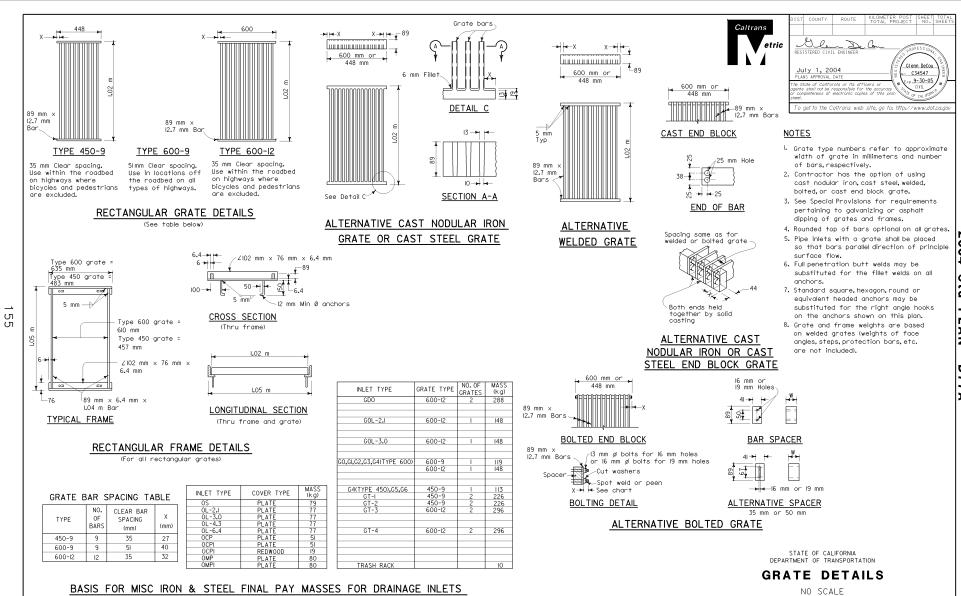
### PIPE INLETS

NO SCALE

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**D75C** 

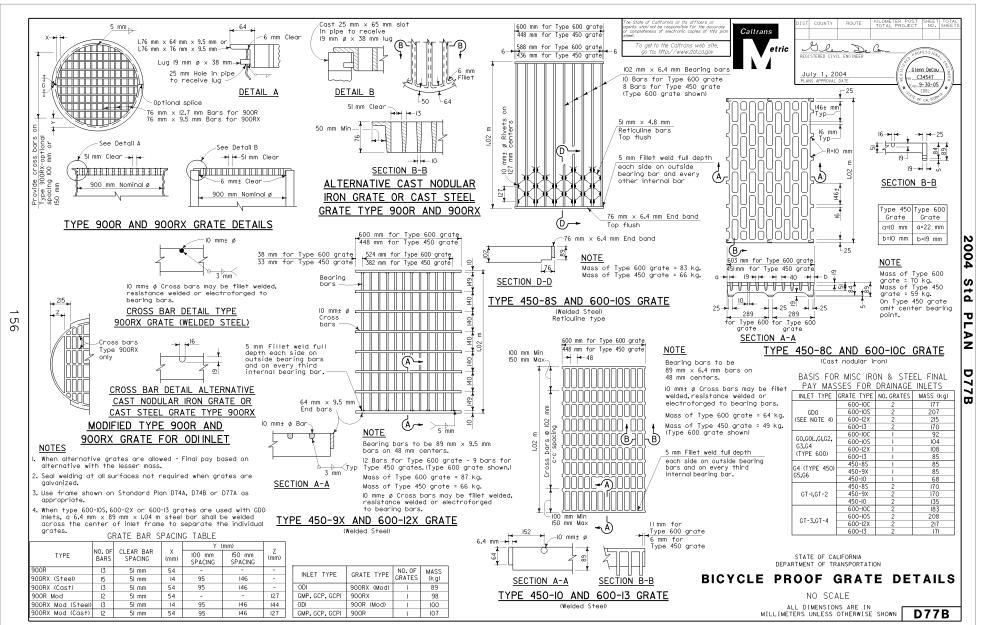


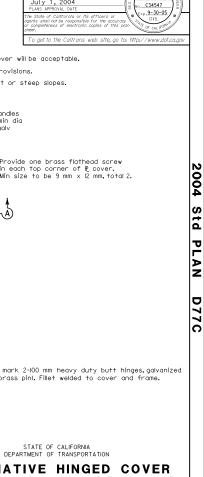


(See General Notes, No 8)

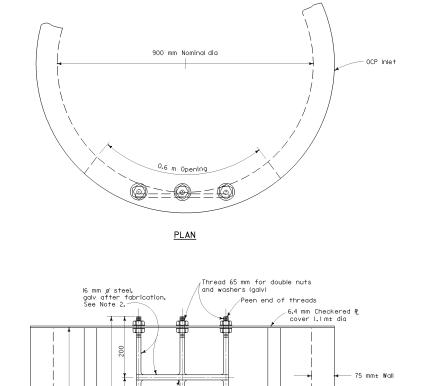
**D77A** 

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN





Glenn DeCou



Weld

**ELEVATION** 

ALTERNATIVE

TRASH RACK FOR TYPE OCP INLET

Single or double opening

8

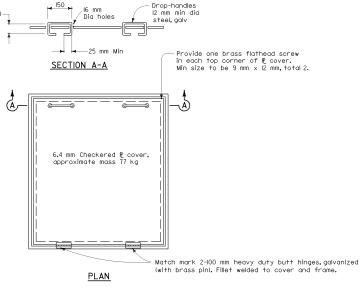
57

### <u>NOTES</u>

I. Alternative methods of securing drop-handles to cover will be acceptable.

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- 2. Galvanizing: See Standard Specifications or Special Provisions.
- $\ensuremath{\mathfrak{J}}_{\star}$  This hinged cover is to be used only on embankment or steep slopes.



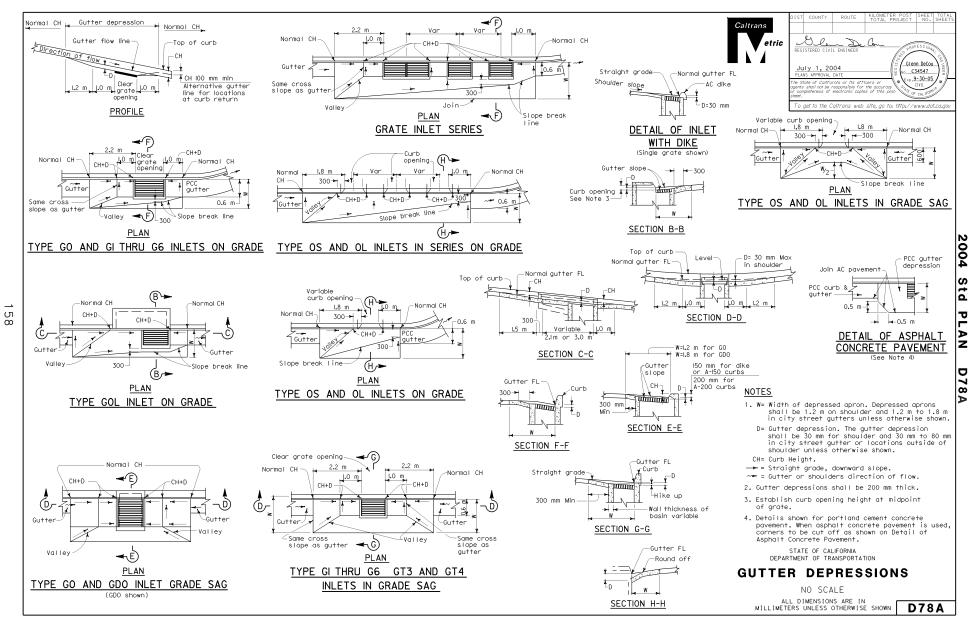
HINGED COVER FOR TYPE OL AND OS INLETS

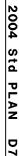
**ALTERNATIVE HINGED COVER** FOR TYPE OL AND OS INLETS AND TRASH RACK FOR TYPE OCP INLET

NO SCALE

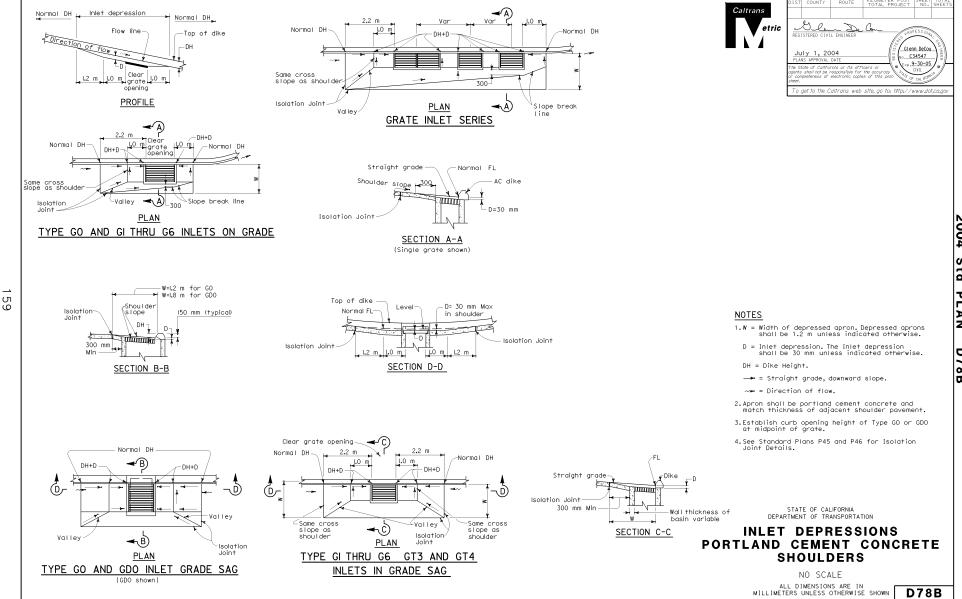
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D77C

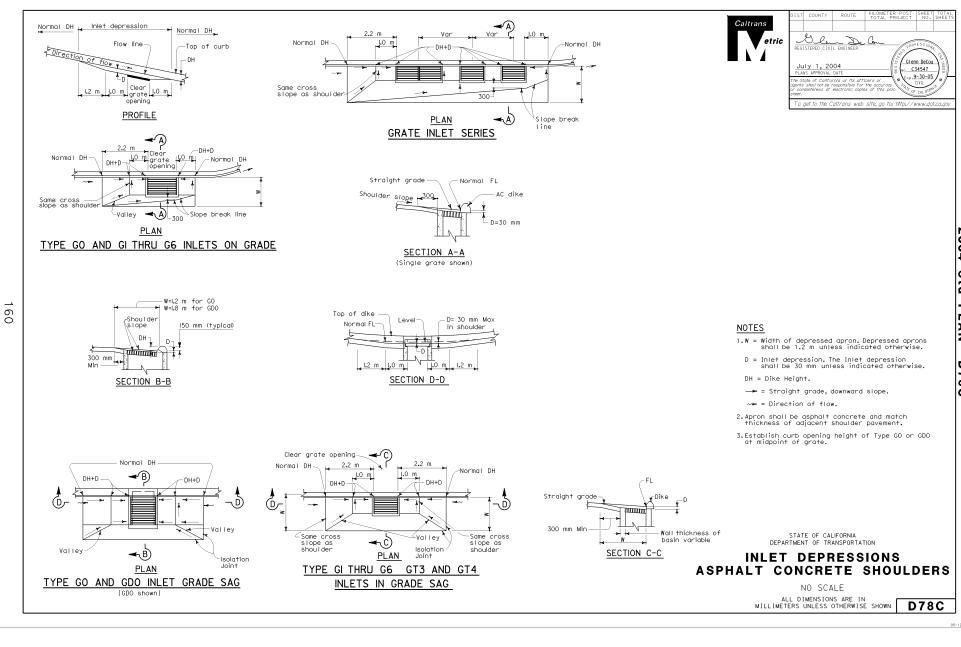








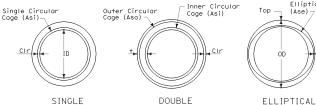




	DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEET:
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To get to the Caltrans web site, go to: http://www.dot.ca.go Elliptical Cage Inner Circular Тор (Ase) -Cage (Asi)



CAGE	REINFORCEMEN'

t = Pipe barral wall thickness, mm

Asi = Inner cage reinforcement, or single circular cage reinforcement, square mm/m

Aso = Outer cage reinforcement, square mm/m

Ase = Elliptical single cage reinforcement, square mm/m

ID = Inside Diameter, mm

OD = Outside Diameter, mm

Cir = Design clearance, mm (see Note 6)

#### DESIGN NOTES

Design: Bridge Design Specifications (1983 AASHTO with interims and revisions by Caltrans)

A. Earth Loading:

Earth Pressures - Vertical: 22.0 kPa/m

Horizontal: Varies, see design lateral pressure chart (Circular Pipe only)

B. Unit Stresses: (Used in Design Tables) fy = 450 MPaf1c = See Tables

 $\ensuremath{\text{C.The}}$  RCP as shown on this sheet is not intended to be used in a corrosive environment. A special design may be required.

|--|

WALL AA

24 m MAX COVER

METHOD 3B

Asi Aso

720 280

1210 590 1330 680

150

360

280

400 150

510

610 210

850

990

1100 530

mm

175

750 150

900 163

1200 188

1350 200

1500 213

1650 225

U<sub>0</sub> 0 1800 238 - 4 1950 250

- 1. For details of the method of excavation, backfill and bedding (Method 1, Method 2, etc.), see Standard Plan A62D.
- 2. The tables for minimum allowable classes and D-loads of RCP on Standard Plan A62D shall not apply to direct design RCP.
- 3. Notes 3, 9 and 10 on Standard Plan A62D shall apply to direct design RCP.
- 4. Throughout the length of any given culvert, the direct design selected by the Contractor shall be the same, including the method of excavation, backfill and bedding.
- 5. The embankment height prior to excavation specified in note 5 of the Standard Plan A62D shall apply to the direct design RCP instal lation when Method 2, 3A or 3B are used.
- 6. For single circular cage reinforcement, minimum clearance shall be 40% of the wall thickness (t). For elliptical and double circular cage reinforcement where the wall PRECAST REINFORCED thickness (+) is less than 65 mm, the minimum clearance (CIr) for reinforcement shall be 20 mm, and where the wall thickness (+) is 65 mm or more the minimum clearance (CIr) CONCRETE PIPE for reinforcement shall be 25 mm. **DIRECT DESIGN METHOD**
- Minimum cover measured at the edge of pavement shall be 600 mm to top of AC pavement and 300 mm to top of rigid pavement.

NO SCALE

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DEPARTMENT OF TRANSPORTATION

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**D79** 

1 11 1	1300	123	100	700	120	220	300	330	700	300	420	1140	210	1300	740	410	100	450	320	450	950	040
U	1650	138	720	420	740	550	360	570	420	300	420	1250	610	1500	800	510	830	530	340	530	1040	680
4	1800	150	740	420	760	550	360	570	400	300	420	1330	660	1630	870	550	890	550	360	570	1120	720
	1950	163	760	420	780	570	380	590	420	300	440	1460	700	1910	930	590	950	590	400	610	1210	780
	2100	175	800	440	830	590	380	610	420	300	550	1570	760	-	990	640	1040	660	420	680	1290	830
	2250	188	850	470	870	640	400	660	440	300	610	-	-	-	1080	680	1140	700	470	720	1400	890
	2400	200	910	490	930	660	420	700	440	300	700	-	-	-	1140	720	1290	740	490	760	1500	950
	2550	213	970	530	990	720	470	800	490	320	800	-	-	-	1230	760	1480	800	530	830	1590	990
	2700	225	1040	570	1060	760	490	890	530	340	890	-	-	-	1310	830	1690	850	550	890	1690	1060
												W	IALL	В								
				MINIM	IUM C	OVER	TO 3	3 m 1	MAX (	OVER				(	5 m	MAX	COVER	₹			12 m MA	X COVER
	ID	†	ME	THOD	1	ME	THOD	2	ME	THOD	3A	МЕ	THOD	1	ME	THOD	2	ME	THOD	3A	METHO	DD 3A
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					_									_								
	m	m	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso
	600	m 75	Asi 250	Aso - - 190	Ase -	Asi 210	Aso - - 170	Ase -	190 250 230	Aso - - 150	Ase -	Asi 380	Aso -	Ase -	Asi 250	Aso -	Ase -	Asi 190	Aso -	Ase -	Asi 380	Aso –
Pa	750 900 1050	75 88 100 113	Asi 250 400	Aso - - 190 230	Ase - 320 380 440	Asi 210 300 280 320	Aso - - 170 190	Ase - 250 300 340	Asi 190 250 230 280	Aso - - 150 170	Ase - 210 230 280	Asi 380 530 490 570	Aso - - 230 300	Ase - 470 590 740	Asi 250 340 340 380	Aso - - 190 210	Ase - 280 340 400	Asi 190 230 230 280	Aso - - 150 170	Ase - 210 230 280	Asi 380 510 470 530	Aso - - 280 320
MP	750 900 1050	75 88 100 113 125	Asi 250 400 380 440 510	Aso - - 190 230 280	Ase - 320 380 440 510	Asi 210 300 280 320 380	Aso - - 170 190 230	Ase - 250 300 340 380	Asi 190 250 230 280 300	Aso - - 150 170 190	Ase - 210 230 280 320	Asi 380 530 490 570 660	Aso - - 230 300 340	Ase - 470 590 740 910	Asi 250 340 340 380 440	Aso - - 190 210 250	Ase - 280 340 400 470	Asi 190 230 230 280 320	Aso - - 150 170 190	Ase - 210 230 280 320	Asi 380 510 470 530 610	Aso - - 280 320 380
35 MPa	m 600 750 900 1050 1200 1350	75 88 100 113 125 138	Asi 250 400 380 440 510 550	Aso - 190 230 280 300	Ase - 320 380 440 510 550	Asi 210 300 280 320 380 400	Aso - 170 190 230 250	Ase - 250 300 340 380 400	Asi 190 250 230 280 300 320	Aso - 150 170 190 210	Ase - 210 230 280 320 320	Asi 380 530 490 570 660 760	Aso - 230 300 340 380	Ase - 470 590 740 910 1060	Asi 250 340 340 380 440 510	Aso - 190 210 250 300	Ase - 280 340 400 470 510	Asi 190 230 230 280 320 360	Aso - 150 170 190 210	Ase - 210 230 280 320 380	Asi 380 510 470 530 610 700	Aso - 280 320 380 440
5 MP	m 600 750 900 1050 1200 1350 1500	75 88 100 113 125 138 150	Asi 250 400 380 440 510 550	Aso - 190 230 280 300 320	Ase - 320 380 440 510 550 590	Asi 210 300 280 320 380 400 420	Aso - 170 190 230 250 280	Ase - 250 300 340 380 400 420	Asi 190 250 230 280 300 320 340	Aso - 150 170 190 210 210	Ase - 210 230 280 320 320 340	Asi 380 530 490 570 660 760 850	Aso - 230 300 340 380 440	Ase - 470 590 740 910 1060 1270	Asi 250 340 340 380 440 510	Aso - 190 210 250 300 340	Ase - 280 340 400 470 510	Asi 190 230 230 280 320 360 400	Aso - 150 170 190 210 230	Ase - 210 230 280 320 380 420	Asi 380 510 470 530 610 700 780	Aso - 280 320 380 440 490
35 MP	m 600 750 900 1050 1200 1350 1500	75 88 100 113 125 138 150	Asi 250 400 380 440 510 550 570 610	Aso - 190 230 280 300 320 320	Ase - 320 380 440 510 550 590 640	Asi 210 300 280 320 380 400 420 440	Aso - 170 190 230 250 280 300	Ase - 250 300 340 380 400 420 440	Asi 190 250 230 280 300 320 340 360	Aso - 150 170 190 210 230	Ase - 210 230 280 320 320 340 380	Asi 380 530 490 570 660 760 850 930	Aso - 230 300 340 380 440 490	Ase - 470 590 740 910 1060 1270 1550	Asi 250 340 340 380 440 510 570 640	Aso - 190 210 250 300 340 380	Ase - 280 340 400 470 510 570 640	Asi 190 230 230 280 320 360 400 440	Aso - 150 170 190 210 230 300	Ase - 210 230 280 320 380 420 440	Asi 380 510 470 530 610 700 780 870	Aso - 280 320 380 440 490 550
= 35 MP	m 600 750 900 1050 1200 1350 1500 1650	75 88 100 113 125 138 150 163 175	Asi 250 400 380 440 510 550 570 610 640	Aso - - 190 230 280 300 320 320 340	Ase - 320 380 440 510 550 590 640 660	Asi 210 300 280 320 380 400 420 440 440	Aso - 170 190 230 250 280 300 300	Ase - 250 300 340 380 400 420 440 470	Asi 190 250 230 280 300 320 340 360 360	Aso - 150 170 190 210 230 230	Ase - 210 230 280 320 320 340 380 400	Asi 380 530 490 570 660 760 850 930 1100	Aso - 230 300 340 380 440 490 550	Ase - 470 590 740 910 1060 1270 1550 1840	Asi 250 340 340 380 440 510 570 640 700	Aso - 190 210 250 300 340 380 420	Ase - 280 340 400 470 510 570 640 720	Asi 190 230 230 280 320 360 400 440 530	Aso - 150 170 190 210 230 300 320	Ase - 210 230 280 320 380 420 440 530	Asi 380 510 470 530 610 700 780 870 950	Aso
1c = 35 MP	m 600 750 900 1050 1200 1350 1500 1650 1800 1950	75 88 100 113 125 138 150 163 175	Asi 250 400 380 440 510 550 570 610 640 660	Aso - 190 230 280 300 320 320 340 360	Ase - 320 380 440 510 550 590 640 660 680	Asi 210 300 280 320 380 400 420 440 440 470	Aso - 170 190 230 250 280 300 300 320	Ase - 250 300 340 380 400 420 440 470 510	Asi 190 250 230 280 300 320 340 360 360 380	Aso - 150 170 190 210 210 230 230 250	Ase - 210 230 280 320 320 340 380 400 470	Asi 380 530 490 570 660 760 850 930 1100	Aso - 230 300 340 380 440 490 550 590	Ase - 470 590 740 910 1060 1270 1550 1840 2140	Asi 250 340 340 380 440 510 570 640 700 760	Aso - 190 210 250 300 340 380 420 470	Ase - 280 340 400 470 510 570 640 720 780	Asi 190 230 230 280 320 360 400 440 530 550	Aso - - 150 170 190 210 230 300 320 340	Ase - 210 230 280 320 380 420 440 530 570	Asi 380 510 470 530 610 700 780 870 950 1040	Aso — — — — — — — — — — — — — — — — — — —
1c = 35 MP	m 600 750 900 1050 1200 1350 1500 1650	75 88 100 113 125 138 150 163 175	Asi 250 400 380 440 510 550 570 610 640	Aso - - 190 230 280 300 320 320 340	Ase - 320 380 440 510 550 590 640 660	Asi 210 300 280 320 380 400 420 440 440	Aso - 170 190 230 250 280 300 300	Ase - 250 300 340 380 400 420 440 470	Asi 190 250 230 280 300 320 340 360 360	Aso - 150 170 190 210 230 230	Ase - 210 230 280 320 320 340 380 400 470	Asi 380 530 490 570 660 760 850 930 1100	Aso - 230 300 340 380 440 490 550 590	Ase - 470 590 740 910 1060 1270 1550 1840	Asi 250 340 340 380 440 510 570 640 700	Aso - 190 210 250 300 340 380 420 470 510	Ase - 280 340 400 470 510 570 640 720	Asi 190 230 230 280 320 360 400 440 530 550	Aso - 150 170 190 210 230 300 320	Ase - 210 230 280 320 380 420 440 530	Asi 380 510 470 530 610 700 780 870 950	Aso

 2400
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 720
 950
 50
 1160
 680
 420
 720
 1250
 800

 2550
 238
 890
 470
 950
 610
 380
 800
 470
 300
 800
 1040
 660
 1350
 740
 470
 800
 1350
 870

 2700
 250
 950
 510
 1140
 660
 400
 910
 510
 320
 910
 1100
 680
 1500
 800
 1350
 870

 2700
 250
 950
 510
 1140
 660
 400
 910
 510
 320
 910
 1100
 680
 1500
 800
 1350
 870

 2700
 250
 510
 1140
 660
 400
 910
 510
 910
 1100
 680
 1500
 800
 1350
 870

WALL A

Asi Aso Ase Asi Aso Ase Asi Aso Ase Asi Aso Ase Asi Aso Ase Asi Aso Ase

450 280 490 440 280 440 360 250 360 780 400 800 530 340 550 340 210 340

1500 | 125 | 700 | 400 | 720 | 550 | 360 | 550 | 400 | 300 | 420 | 1140 | 570 | 1380 | 740 | 470 | 760 | 490 | 320 | 490 | 950 | 640

88 530 320 590 490 320 490 380 280 380 850 440 950 570 360 590 360 230 380

113 680 400 700 530 360 530 400 300 420 1040 530 1230 680 420 700 440 300 440

1200 100 660 380 680 510 340 530 400 280 400 950 490 1080 640 380 640 400 250 400

METHOD 1 METHOD 2 METHOD 3A METHOD 1 METHOD 2 METHOD 3A METHOD 3A

6 m MAX COVER

470 - - 300 - - 210 -660 - 640 420 - - 300 -

12 m MAX COVER

570 380

550

700 470

740 510

870 590

800

MINIMUM COVER TO 3 m MAX COVER

- - 280 - - 210 -- - 380 - - 320 -

2400 225 830 420 850 570 340 720 420 250 720

750 69 400

900 75

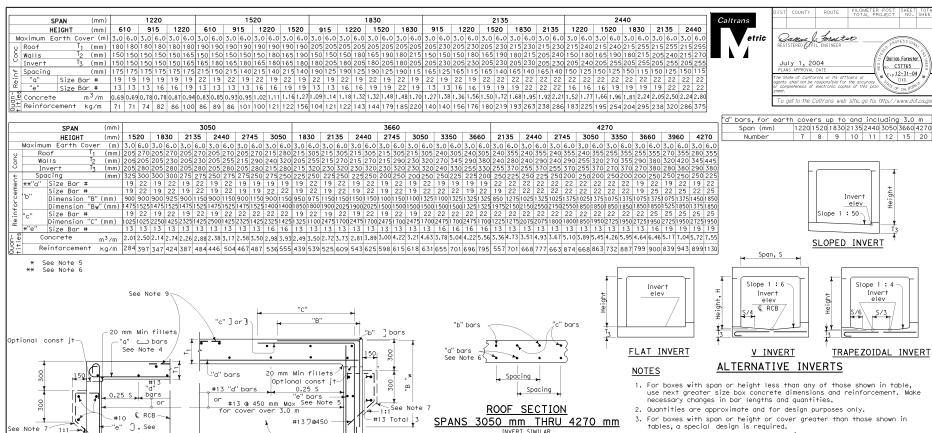
0

7				WAL	L BB
:R	Ш			24 m M	AX COVER
	П	ID	+	METH	IOD 3B
		m	m	Asi	Aso
		600	163	230	150
	MPa	750	175	340	150
		900	188	440	150
	35	1050	200	530	150
	п	1200	213	660	190
	U	1350	225	780	280
	4	1500	238	870	340
		1650	250	1140	420
	٥ <sub>0</sub>	1800	265	1230	510
] [4]	₹	1950	280	1310	570
100	20	2100	290	1330	610
] [ <u>+</u> `	₽¥	2250	305	1440	700

Г											WALL	Χ						
			MIN	COVER	TO:	3 m I	MAX C	OVER	3.1	m T	0 6	m MA	X CO	VER	6.1 m	TO 9	m MAX	COVER
	ID	+	ME	THOD	3A	ME	THOD	3B	ME	THOD	3A	ME	THOD	3B	METHO	DD 3A	METHO	DD 3B
	m	m	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Asi	Aso
	600	47	280	-	-	250	-	-	250	-	-	210	-	-	380	-	320	-
	750	53	380	-	-	360	-	-	320	-	-	250	-	-	490	-	400	-
	900	59	400	320	400	380	280	380	360	-	300	300	-	250	440	320	450	-
MPa	1050	63	610	490	610	570	440	570	420	-	420	340	-	340	660	490	510	380
Σ	1200	69	660	510	660	590	470	610	530	-	490	420	-	380	740	550	590	440
42	1350	75	660	530	660	610	490	610	590	-	510	490	-	400	760	550	590	440
l III	1500	88	610	490	640	570	440	590	680	-	530	550	-	420	780	570	610	470
U	1650	94	610	490	610	570	440	590	590	420	590	490	360	490	890	640	700	530
4	1800	105	570	440	570	530	400	550	590	420	590	490	340	490	870	610	700	510
	1950	119	530	400	550	510	380	510	590	420	610	490	360	510	870	610	700	510
	2100	132	530	400	570	490	360	530	610	440	640	510	360	530	890	640	720	510
	2250	144	510	380	590	470	340	590	700	490	720	590	400	590	990	720	830	590
	2400	150	510	380	680	490	340	680	720	510	740	590	420	680	990	720	830	590
	2550	163	510	380	760	530	340	760	780	550	800	660	470	760	1120	780	910	660
	2700	175	550	380	870	490	340	870	850	590	890	720	510	870	1250	850	990	720



0



'c" bars

WALL SECTION

SPANS 3050 mm THRU 4270 mm

#13 @ 450 Max

50 mm Cir typ-

Const in

1/2 Span

TYPICAL SECTION

SPANS 3050 mm THRU 4270 mm

#13

Alternative

© RCB

"a" bars

m

50 mm Cir

Тур

29

#13 C @450

Const it -

#13

-50 mm Clr typ

See Note 4

Alternative

const it

#13 @ -

⅓ Span

TYPICAL SECTION

SPANS 1220 mm THRU 2440 mm

450 mm Max typ 4. It is permissable to eliminate the 180° hooks on every other bar.

- 5. "e" bars are at half spacing (spans 3050 mm 4270 mm only).
- 6. "a" bars are at half spacing (spans 3050 mm 4270 mm only).
- 7. Provide paving notch when top is exposed and when pavement is portland cement concrete, and adjust quantities.
- 8. For design and details not shown, see Standard Plan D82.
- 9. For exposed top, provide #13 @ 450 mm each way (600 mm lap "c" bars or full span and adjust).

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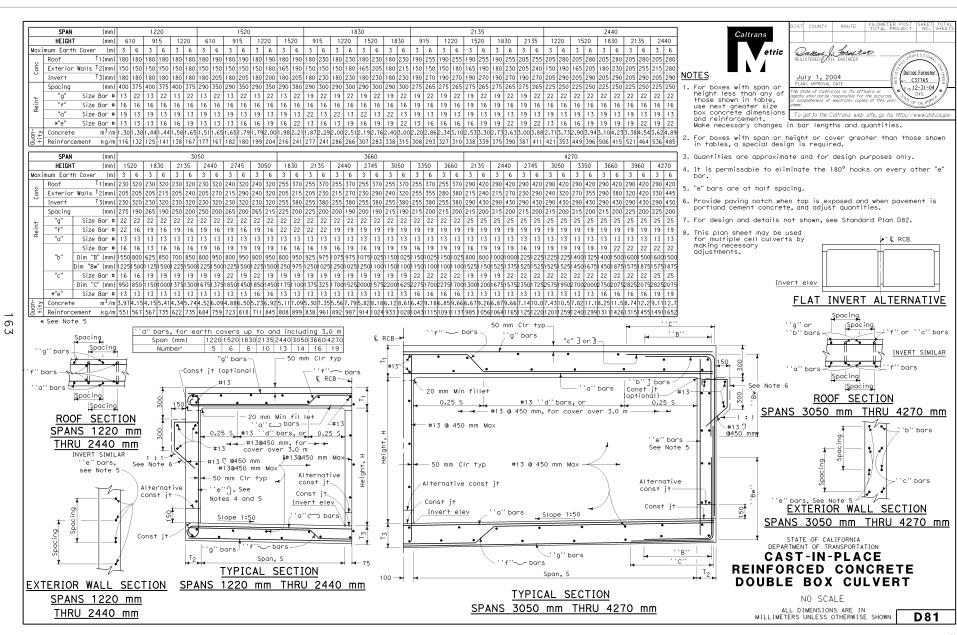
### CAST-IN-PLACE REINFORCED CONCRETE SINGLE BOX CULVERT

NO SCALE

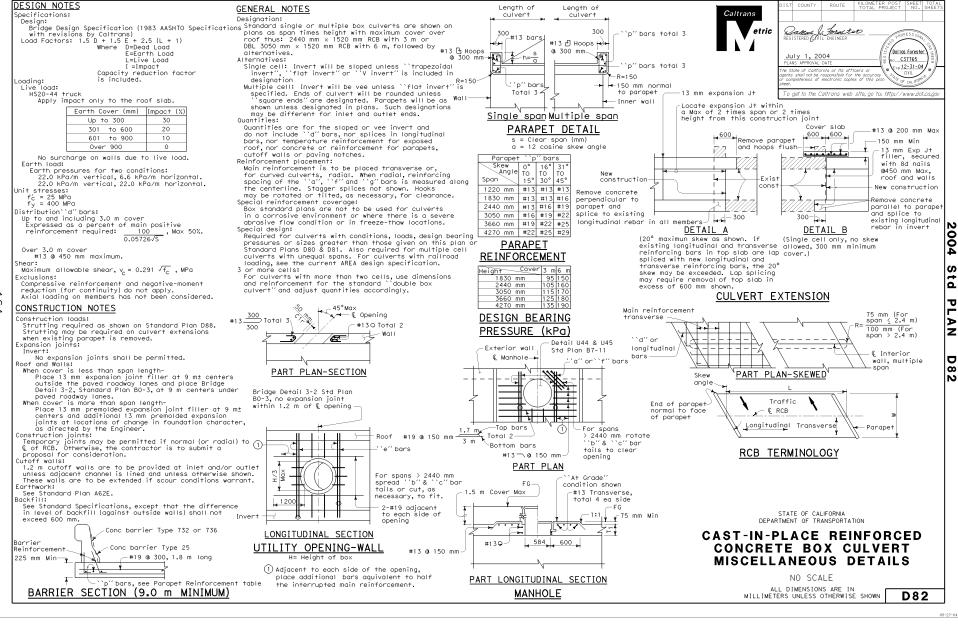
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

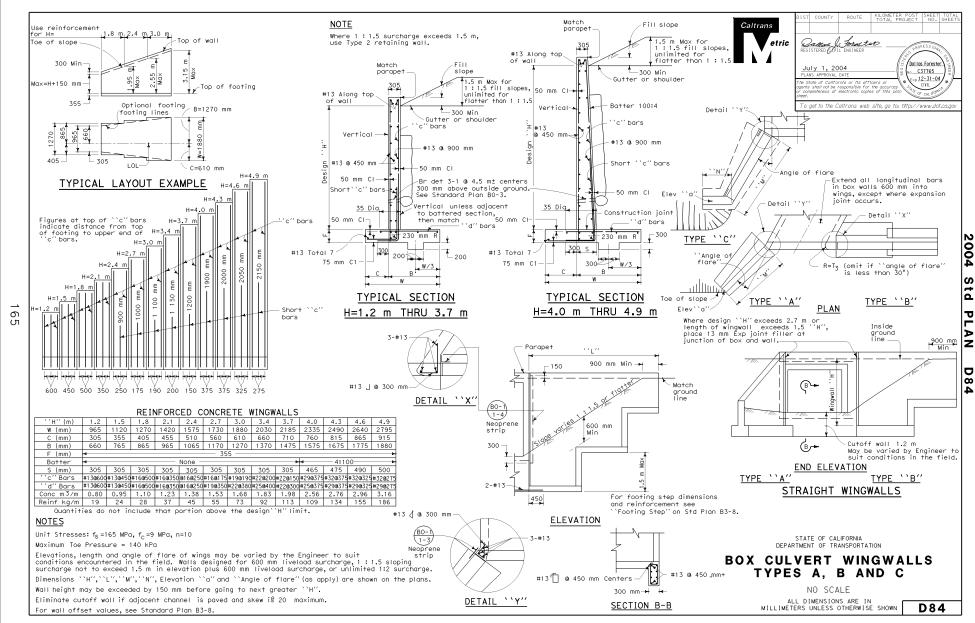
D80



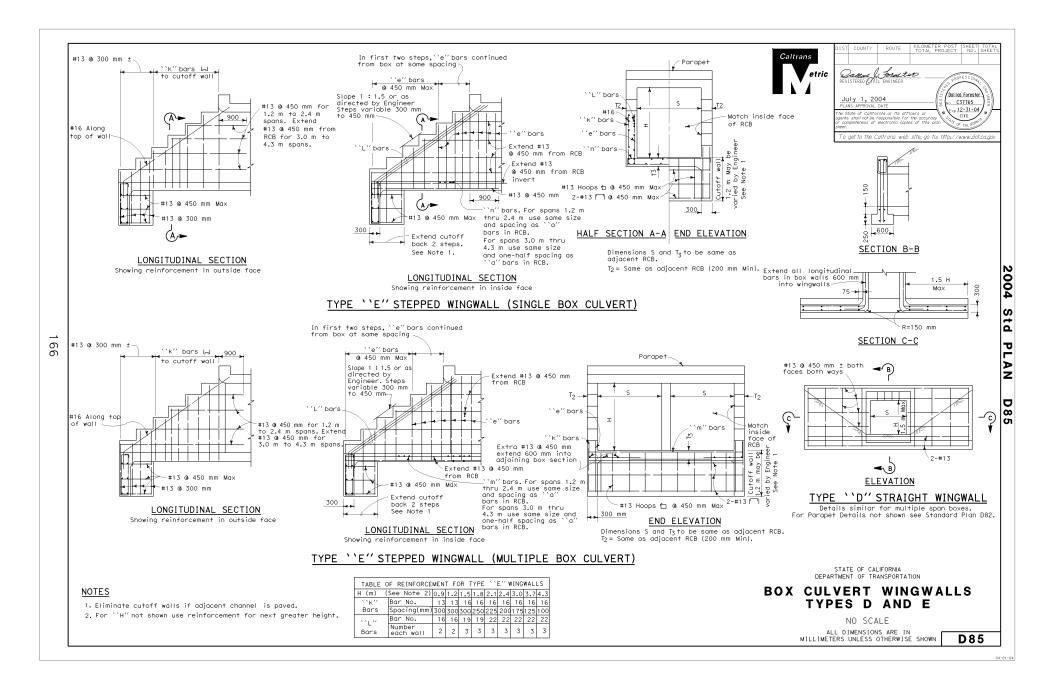


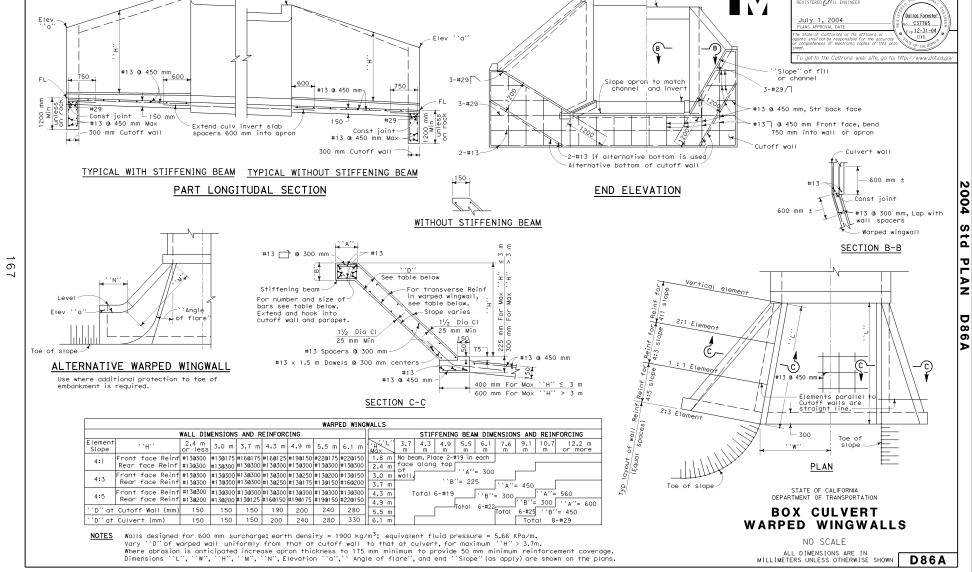






04-01-0

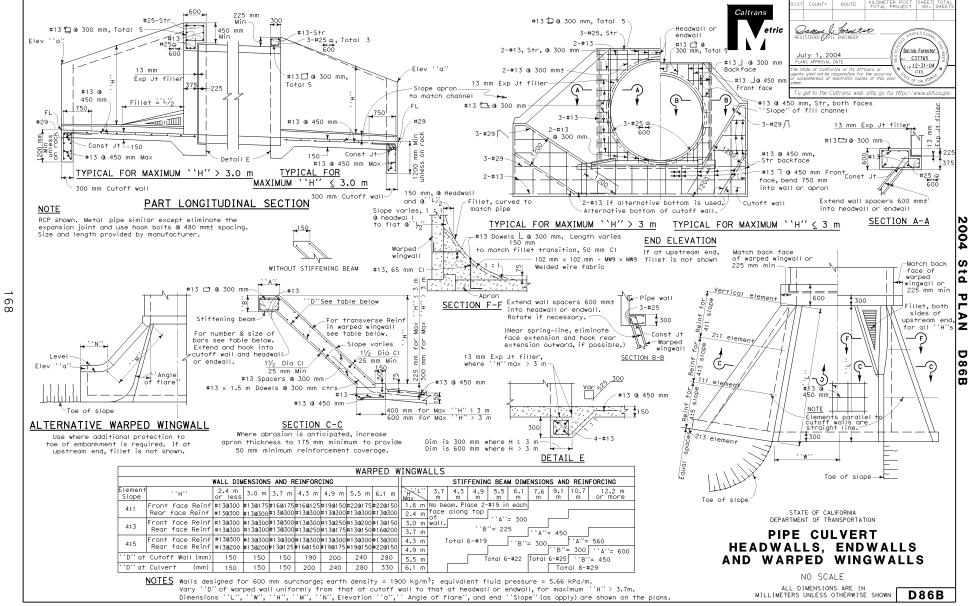


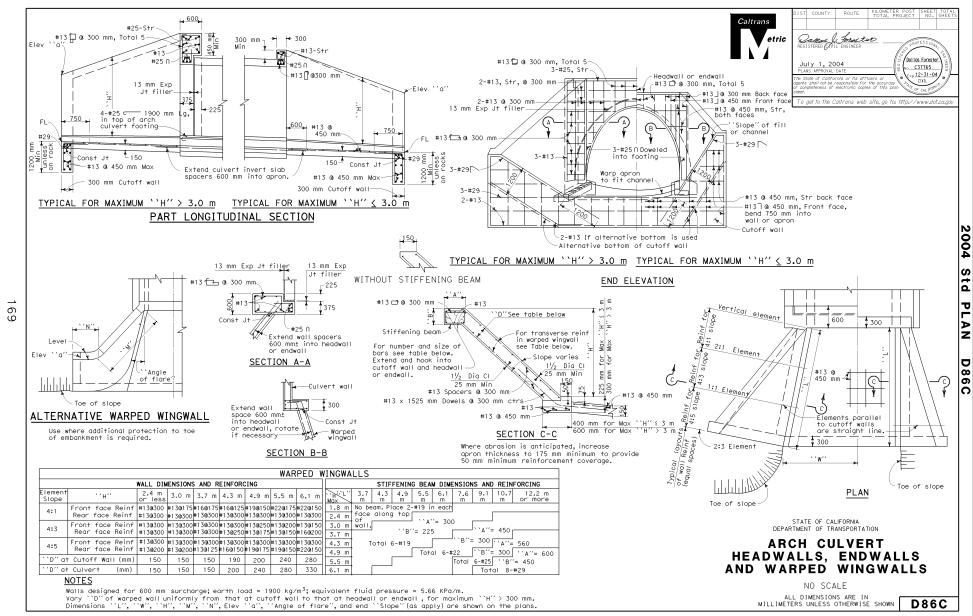


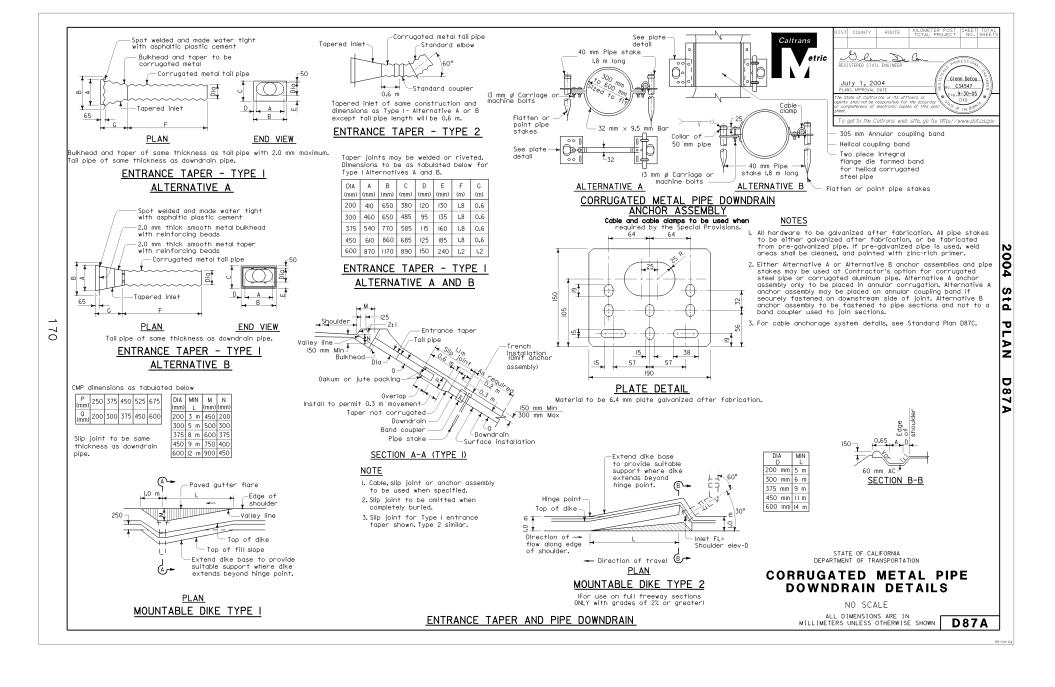
Parapet

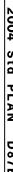
Caltrans

Parapet

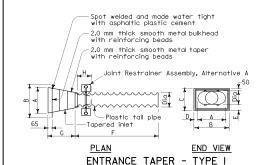












Plastic Pipe dimensions as tabulated below

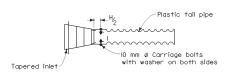
P (mn	<sub>n)</sub> 250	375	450	525	675	DIA (mm)	М	IN
(mr	n) 200	300	375	450	600	200	-	
_				_		300	5	m
						375	8	m

_	1 000	91	-	DOIG	
	DIA (mm)	М	IN	M (mm)	N (mm)
	200	3	m	450	200
J	300	5	m	500	300
	375	8	m	600	375
	450	9	m	750	400
	600	12	m	900	450

Taper joints may be welded or riveted. Dimensions to be as tabulated below

billiorididio to be de tabulated below:										
DIA	Α	В	С	D	Ε	F	G	Н		
(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m)	(m)	(mm)		
200	410	650	380	120	130	1.8	0.6	300		
300	460	650	485	95	135	1.8	0.6	300		
375	540	770	585	115	160	1.8	0.6	350		
450	610	860	685	125	185	1.8	0.6	400		
600	870	1170	890	150	240	1.2	1.2	450		

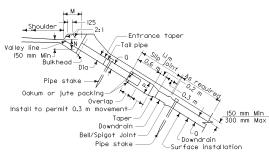
#### ENTRANCE TAPER - TYPE I



<u>PLAN</u>

Alternative tail pipe to entrance pipe connection

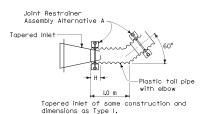




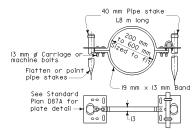
#### SECTION (TYPE I)

#### NOTE

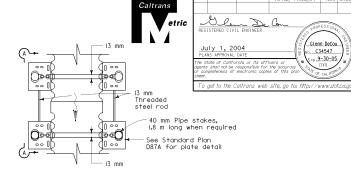
- I. Cable or slip joint to be used when specified.
- 2. Slip joint to be omitted when completely buried.



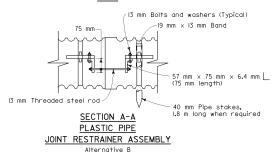
ENTRANCE TAPER - TYPE 2



PLASTIC PIPE JOINT RESTRAINER ASSEMBLY



#### **PLAN**



- I. All hardware to be galvanized after fabrication. All pipe stakes to be either galvanized ofter fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned, and painted with zinc-rich primer.
- 2. See Standard Plan D87A for details of entrance taper placement
- 3. Pipe stakes to be used with joint restrainer when specified.
- 4. Plastic pipe and fittings used for overside drains shall be from one manufacturer for each installation.
- Entrance taper "H" dimension is length of insertion of metal taper into plastic pipe.
- 6. For cable anchorage system details, see Standard Plan D87C.
- 7. At contractors option, tail pipe and tapered inlet may be supplied from manufacturer as a pre-connected unit as shown in Detail A.

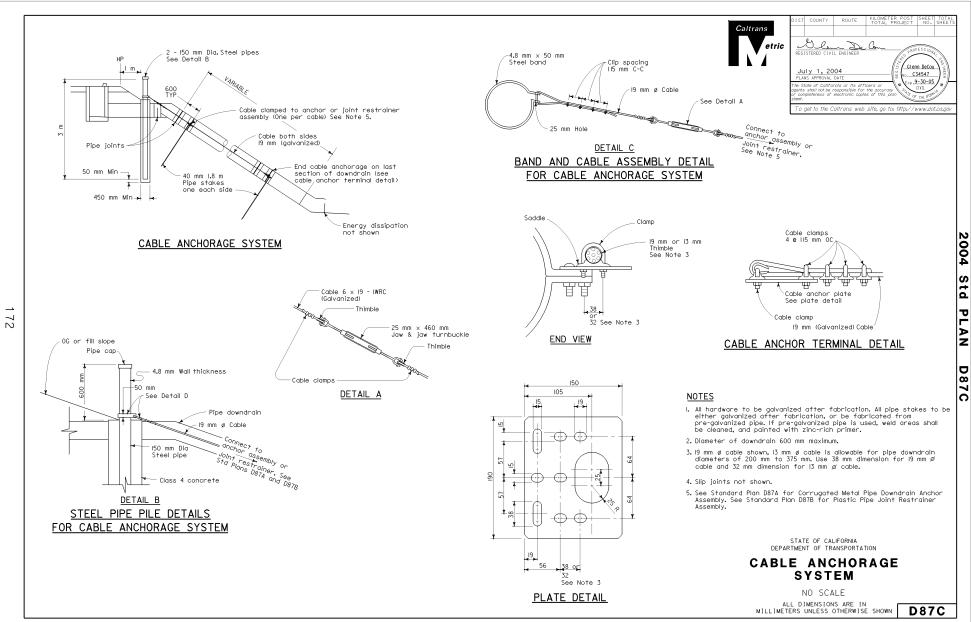
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

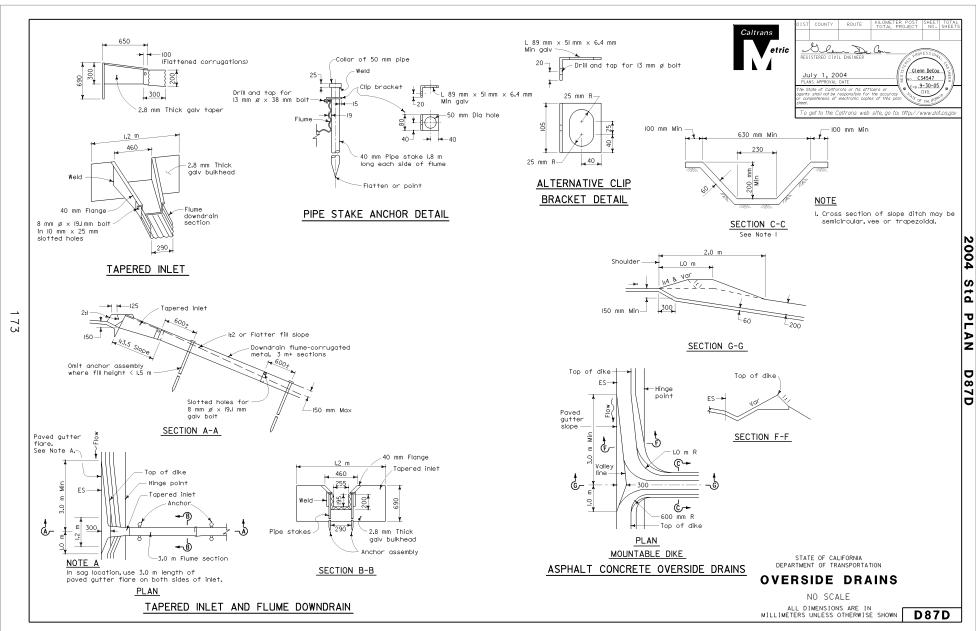
# PLASTIC PIPE **DOWNDRAIN DETAILS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D87B





#### TABLE OF MINIMUM COVER AND STRUTTING REQUIREMENTS FOR CONSTRUCTION LOADS

	TABLE OF MINIMUM COVER AND CHICATING REGISTEMENTS FOR CONCENTRATION ESTABLISHED											
		TYF	PE		80-222 KN AXLE		222-334 kN AXLE		334	-489 KN AXLE	489-667 KN AXLE	
	MAXIMUM DESIGN FILL	SPAN	CELLS	MIN COVER	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING
	3.0 m and 6.0 m	1.2 m to 2.4 m	Single and Multiple	1.5 m								
BOX CULVERTS	3.0 m	3.0 m to 4.3 m	Single and Multiple	1.5 m			1/3 Points	Struts 140x140 mm @ 1.0 m Sills 140x184 mm	1/3 Points	Struts 140x184 mm @ 1.0 m Sills 140x184 mm	1/3 Points	Struts 140×184 mm @ 1.0 m Sills 140×184 mm
	6.0 m	3.0 m to 4.3 m	Single and Multiple	1.5 m								



	DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	SHEETS
ric	REGI Ju	STERED (XVI	004	Dallar Que No. C		A INCER
	agents	shall not be i	rnia or its aff respansible for electronic copie	the accuracy	2-31-04 CIVIL CAL VPORT	
	To	get to the C	altrans web	site, go to: http://v	vww.doi	t.ca.gov

Width of haul road RCB culvert Min cover Length to be strutted

MINIMUM LENGTH OF STRUTTING

#### TABLE OF MINIMUM COVER FOR CONSTRUCTION LOADS

TYPE		DIA OR SPAN	80-222kN AXLE	222-334 KN AXLE	334-489 KN AXLE	489-667 KN AXLE
Pipes REINFORCED CONCRETE CULVERTS Arches		Dia 300 mm to 1000 mm	600 mm	900 mm	900 mm	900 mm
		Dia 1050 mm to 2700 mm	Dia 1.75 or 900 mm	Dia 1.75 or 900 mm	Dia 1.75 or 900 mm	Dia 1.75 or 900 mm
		Spans to 4.3 m	Span or 1.2 m	Span or 1.2 m	$\frac{\text{Span}}{2.5}$ or 1.2 m	Span or 1.2 m
	AT CHES	Spans 4.6 m to 6.7 m	$\frac{\text{Span}}{3.5}$ or 1.8 m	Span or 1.8 m	Span or 1.8 m	Span or 1.8 m
	Pipes	Dia to 3000 mm	Dia or 1.2 m	Dia 1.75 or 1.2 m	Dia 1.75 or 1.2 m	Dia 1.75 or 1.2 m
METAL		Dia over 3000 mm	Dia or 1.8 m	Dia or 1.8 m	Dia or 1.8 m	Dia or 1.8 m
CULVERTS Pipe Arches		AII Spans	Span 3 or 1.2 m	Span or 1.2 m	Span or 1.2 m	Span or 1.2 m
Structural Plate Pipe, Arches and Vehicular Undercrossings		All Spans	Span or 1.5 m	<u>Span</u> or 1.5 m	Span or 1.5 m	<u>Span</u> or 1.5 m
Plastic Pipe		Dia 300 mm to 1200 mm	Dia 1.75 or 1.2 m	Dia 1.75 or 1.2 m	Dia 1.75 or 1.2 m	Dia 1.75 or 1.2 m

NOTE Minimum cover shall be the greater value of alternatives shown. The diameter and spans shown in the table to calculate the minimum cover (Example:  $\frac{1}{1}$  are the diameter or span of the facility expressed in number of meters.

# NOTES

Continuous sill-

Length of strutting to be determined by the Engineer, but shall not be less than as shown in the sketch above.

RCB STRUTTING DETAILS

Assumed tire patterns:

140×184 mm Post

222 kN gxle 610x460 mm 334 kN axle 910x610 mm 489 kN axle 910×760 mm 667 kN axle 910x910 mm

Impact = 10%

Sills to be glue-laminated or solid timber.

For strutting requirements of Structural Steel Plate Vehicular Undercrossing, Structural Steel Plate Arches and Structural Steel Plate Pipes during construction, see Standard Plans D88A.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# **CONSTRUCTION LOADS** ON CULVERTS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**D88** 

	Level			
See Note "A"	See table for min cover	<b>1</b>	See Note "A"	
		Dia	Span	NOTE "
	Span Span	REINFORCED	1	Minimum or 3 tim
	BOX CULVERTS	CONCRETE PIPES, PLASTIC PIPES AND	REINFORCED CONCRETE	31 3 1111

METAL CULVERTS ARCH CULVERTS

"A" m distance equals 3 times the span imes the diameter.

2004 Std PLAN

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Dallas Forester C37765 p 12-31-04 CIVIL

To get to the Caltrans web site, go to: http://www.dot.ca.go

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

# STRUT DETAILS FOR STRUCTURAL STEEL PIPES, **ARCHES AND VEHICULAR UNDERCROSSING**

NO SCALE

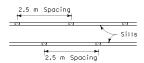
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



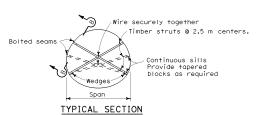
TABLE B

TIMBER STRUTS FOR STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING									
SPAN (mm)	STRUT SIZE (mm)	SILL SIZE (mm)							
4013 - 4724	89×89	89×140							
4800 -5258	89×89	89×184							
Over 5258	140×140	140×184							

Tabular data in Table B based on 152×51 mm corrugations, (Structural steel plate)



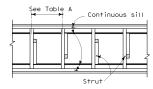
#### SECTION B-B



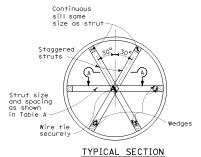
STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING



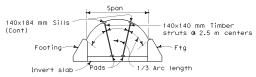
		INDEL	<b>y</b>
		MBER STRUTS FOR URAL STEEL PLAT	
PIPE DIA (mm)	STRUT SIZE (mm)	HEIGH 0 to 6.1 m	T OF FILL GREATER THAN 6.1 m
6100 Thru	184×184	1.5 m SPACING	1.0 m SPACING
6400	235×235	2.5 m SPACING	1.4 m SPACING



SECTION A-A



STRUCTURAL STEEL PLATE PIPES



Caltrans

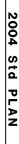
#### TYPICAL SECTION

# STRUCTURAL STEEL PLATE ARCHES

Struts required when span of structural steel plate arch exceeds 5.5 m. Pad size as directed by Engineer.

# <u>NOTES</u>

- 1. Struts shown are minimum required during construction and are for earth loads only.
- 2. Backfill shall be brought up uniformly on both sides of the structure.
- For minimum cover over structure for construction loads, see Standard Plan D88.









COUNTY

Glenn DeCou . C34547

July 1, 2004 he State of California or its officers or

sp\_9-30-05

get to the Caltrans web site, go to: http://www.dot.ca.go

# $\frac{D}{4}$ or 600 mm Min

450 📭

FRONT ELEVATION DOUBLE HEADWALL

19 mm Chamfer



19 mm Chamfer

SINGLE HEADWALL

450

# Omit rounding for pipes less than 1200 mm diameter 230→111→

610

SECTION, SINGLE & DOUBLE HEADWALLS

CMP ARCH SINGLE DOLIBLE SIZE Steel Conc Steel Conc m3 0.6I kg m3 28 0.91 mm kg mm mm 885 2000 3000 6I0×460 7I0×5I0 885×610 3200 3800 1.11 4400 58 1.70 5200 70 2.13 5800 80 2.50 6400 88 2.89 I240×840 6400 7450 78 2.37 96 2.9I 1440×970 1460 1620×1100 1585 1800×1200 1685 8200 104 3.36 9100 116 3.88

STRAIGHT HEADWALLS

190 ---610 SECTION, SINGLE & DOUBLE HEADWALLS

HEADWALL

230 → 11 +

-190

or 600 mm Min

450 -

#### **NOTES**

Caltrans

- L. No deduction made in quantities for thickness of
- 2. All reinforcing steel #13 bars. All vertical and horizontal tie bars 450 mm maximum spacing.
- Length of wall "W" may be varied to suit conditions encountered in the field, and straight line interpolation may be used to calculate quantities.
- 4. Quantities are for design purposes only.
- 5. Cable railing to be installed on top of headwall when shown on Project Plans. See Standard Plan BII-47 for cable railing details.

# | 1200 | 1710 | 4500 | 70 | 2,06 | 6400 | 90 | 2,78 | 1275 | 1785 | 4800 | 80 | 2,26 | 6850 | 102 | 3,06 | 1350 | 1860 | 5100 | 84 | 2,47 | 7150 | 108 | 3,27 | STRAIGHT HEADWALLS

450 -

200

DOUBLE

Steel Conc

19 mm Chamfer

FRONT ELEVATION

SINGLE HEADWALL

SINGLE

Steel Conc

 mm
 mm
 mm
 kg
 m3
 mm
 kg
 m3

 300
 810
 1500
 16
 0.45
 2500
 24
 0.74

 305
 80
 80
 16
 250
 29
 24
 0.17

 375
 885
 1800
 18
 0.56
 2950
 28
 0.91

 450
 960
 2100
 22
 0.68
 3250
 34
 1.04

 525
 035
 2250
 26
 0.76
 3550
 40
 1.18

 600
 1110
 2550
 34
 0.90
 3850
 46
 1.32

 600
 I1I0
 2550
 34
 0.990
 3850
 46
 1.52

 675
 I185
 2850
 38
 1.04
 4300
 52
 1.57

 750
 I260
 3000
 40
 1.3
 4600
 54
 1.69

 825
 I335
 3300
 44
 1.29
 4900
 58
 1.86

 900
 I4I0
 3600
 46
 1.46
 5200
 66
 2.03

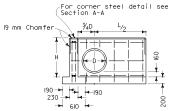
 975
 I485
 3750
 58
 1.57
 5500
 78
 2.21

 1050
 1560
 4050
 62
 1.75
 5800
 84
 2.39

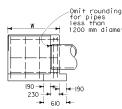
 1125
 1635
 4350
 66
 1.94
 6100
 88
 2.58

200

0



FRONT ELEVATION "L" HEADWALL

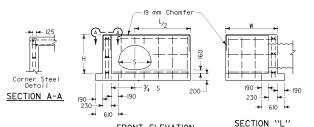


SECTION "L" HEADWALL

Omit rounding for pipes less than 1200 mm diameter
<del> </del>
190 190
→ 610 -
COTION NU // LICADWALL

				LENGTH OF W									
D H L/2		1000		14	1450 19		00 23		50	28	00		
		′2	Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc	
mm	mm	mm	kg	m <sup>3</sup>	kg	m <sup>3</sup>	kg	m <sup>3</sup>	kg	m <sup>3</sup>	kg	m <sup>3</sup>	
300	810	750	22	0.59	26	0.73	_	_	_	_	_	_	
375	885	900	24	0.68	28	0.83		_		_		_	
450	960	1050	28	0.78	32	0.94		_		_		_	
525	1035	1125	32	0.86	40	1.02	_	_		_	I —	_	
600	1110	1275	38	0.96	44	1.13	48	1.30	_	_		_	
675	1185	1425	40	1.07	46	1.25	50	1.43	_	_		-	
750	1260	1500	42	1.16	48	1.34	52	1.53	60	1.72	_	-	
825	1335	1650	46	1.28	52	1.47	60	1.67	66	1.86	_	-	
900	1410	1800	48	1.40	54	1.61	62	1.81	68	2.01	74	2.21	
975	1485	1875	_	-	66	1.71	74	1.92	80	2,13	88	2.33	
050	1560	2025	_		68	1.85	76	2.07	84	2.28	92	2.50	
125	1635	2175	_	_	_	_	78	2.22	88	2.45	94	2.67	
200	1710	2250	_	_	_	_	84	2.34	94	2.57	100	2.81	
275	1785	2400	_		_	_	_	_	96	2.75	102	2.98	
350	1860	2550	_		_	_	<u> </u>		102	2.92	110	3.17	

"L" HEADWALLS CIRCULAR PIPE CULVERT HEADWALLS



19 mm Chamfer

FRONT ELEVATION

DOUBLE HEADWALL

FRONT ELEVATION "L" HEADWALL

CMP		LENGTH OF W										
ARCH	Н	Lz	10	00	14	50	19	00	23	50	28	00
SIZE		L/2	Steel	Conc								
mm	mm	mm	kg	m3								
530×380	885	1000	26	0.74	30	0.89	34	1.04	40	1.18	44	1.33
6I0×460	960	1150	28	0.84	32	1.00	36	1,15	42	1.30	50	1.46
710×510	1010	1300	32	0.93	36	1.09	40	1.25	44	1.41	52	1.57
885×610	1110	1600	44	1.13	50	1.30	54	1.47	62	1.64	70	1.81
1060×740	1235	1900	52	1.36	58	1.54	62	1.72	70	1.90	76	2.09
1240×840	1335	2200	58	1.58	64	1.77	70	1.96	76	2.16	82	2.35
1440×970	1460	2600	64	1.89	72	2.09	78	2.30	84	2.51	92	2.71
1620×1100	1585	2900	84	2.16	90	2.38	96	2.60	104	2.82	112	3.04
1800×1200	1685	3200	90	2.44	96	2.66	104	2.89	112	3.12	120	3.35

#### "L" HEADWALLS

# CORRUGATED METAL PIPE ARCH CULVERT HEADWALLS

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

## PIPE HEADWALLS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

H5.8 m

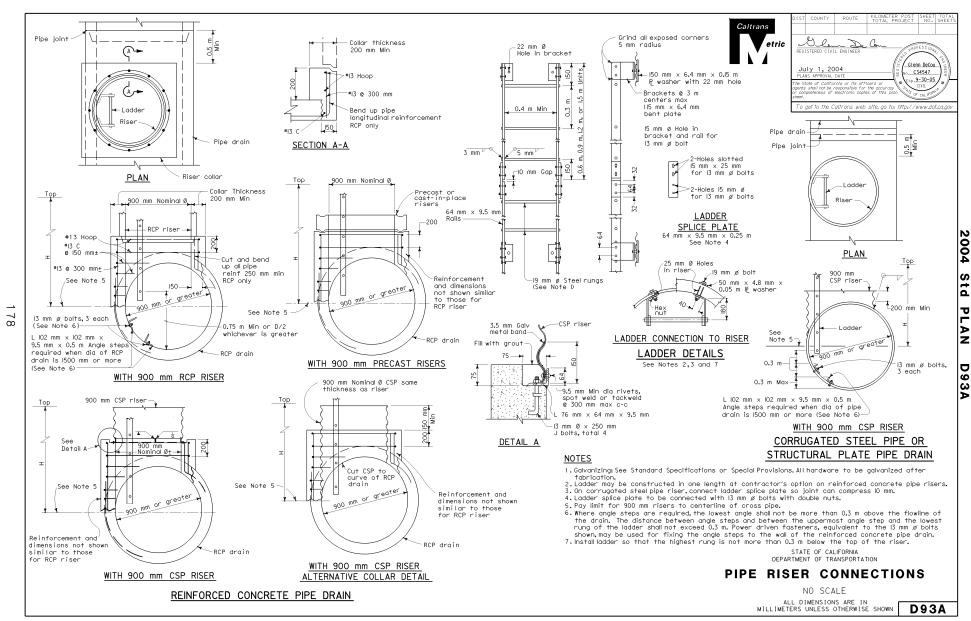
Use reinforcement

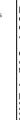
Top of wall

Toe of slope

for H =

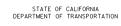
Caltrans





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> Std PLAN

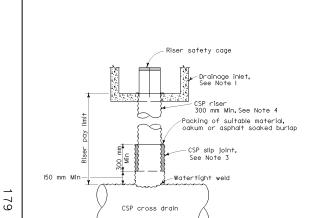


# DRAINAGE INLET RISER CONNECTIONS

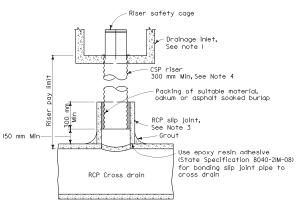
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

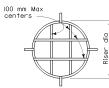




CSP RISER FOR DRAINAGE INLET



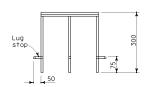
CSP RISER FOR DRAINAGE INLET



Caltrans

\*10 Bars throughout with welded joints

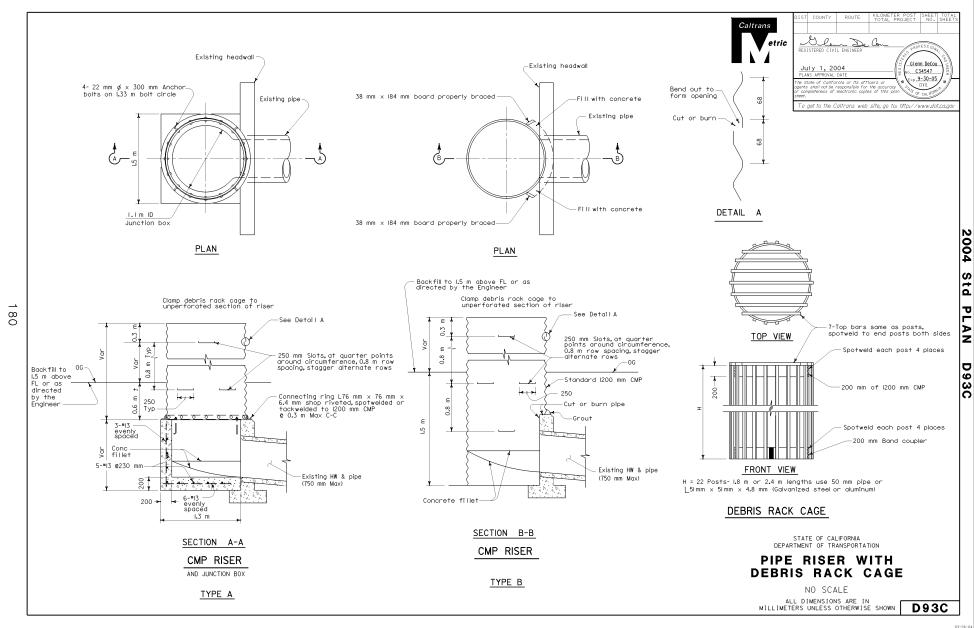
To get to the Caltrans web site, go to: http://www.dot.ca.go

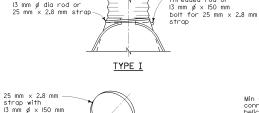


**ELEVATION** RISER SAFETY CAGE DETAIL

#### **NOTES**

- 1. Structure at top of riser may be any standard drainage inlet or pipe inlet.
- 2. Galvanizing: See Standard Specifications or Special Provision.
- 3. Diameter of slip joint to be 75 mm greater than diameter of riser.
- 4. Plastic pipe riser may be substituted for CSP riser shown. Slip joint diameter to be as necessary to accommodate plastic pipe outside diameter.
- 5. For plastic pipe cross drain, use fabricated reducing tee of same material as cross drain as appropriate to provide watertight connection.





16 mm ø threaded TYPE II

Reinforced

edge. See Note 2

<u>PLAN</u>

rise

Toe P

W Min

See Note 4. **ELEVATION** 

<sub>50</sub> 📑

Limit of payment

Skirt H

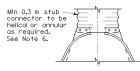
Toe PL shall be securely

attached to the skirt.

-Finished earth slope as required

TYPICAL CROSS-SECTION





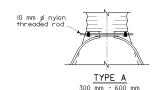
TYPE III

#### CONNECTOR STRAP DETAIL

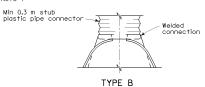
# ALTERNATIVE CONNECTIONS FOR PIPE TO METAL FLARED END SECTIONS

Lua connector for

threaded rod or



 $\infty$ 



750 mm - 900 mm

# ALTERNATIVE CONNECTIONS FOR PIPE TO PLASTIC FLARED END SECTIONS

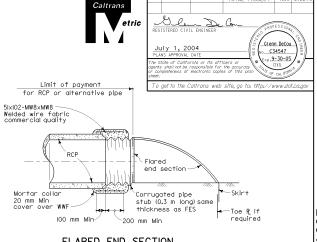
		CIRCUL	AR P	IPES		
PIPE	END		DIMENSI	N-MILLIN	<b>METERS</b>	
DIA	SECTION THICKNESS	Α	В	Н	L	W
(mm)	(mm)	25 mm±	Max	25 mm±	40 mm±	50 mm
300*	1.6	150	150	150	530	610
375 *	1.6	180	200	150	660	760
450 *	1.6	200	250	150	790	910
525	1.6	230	300	150	910	1070
600*	1.6	250	330	150	1040	1220
750 *	2.0	300	410	200	1300	1520
900*	2.0	360	480	230	1520	1830
1050	2.8	410	560	280	1750	2130
1200	2.8	460	690	300	1980	2290
1350	2.8	460	760	300	2130	2590
1500	2.8	460	840	300	2210	2900
1650	2.8	460	910	300	2210	3050
1800	2.8	460	990	300	2210	3200
1950	2.8	460	1070	300	2210	3350
2100	2.8	460	1140	300	2210	3510

<sup>\*</sup>Equivalent plastic FES to meet AASHTO M-294 and ASTM D-1248 Specifications, and shall conform to all dimensions shown above except for end section thickness, which may be 0.1mm thinner.

#### PIPE-ARCHES DIMENSION-MILLIMETERS DESIGNATION SECTION Α В THICKNES: SPAN RISE 25 mm± Max (mm) 375 1.6 180 250 150 580 910 600 450 1.6 200 300 150 710 1070 700 500 1.6 230 360 150 600 410 150 990 1050 725 2.0 300 460 200 1170 825 330 230 1350 1225 530 2160 950 2.8 1425 460 660 300 1600 2290 1600 1075 2.8 460 760 300 1775 1175 2.8 1925 | 1300 2.8 2075 1425 2.8 460 990 300 1960

# 25 mm± 40 mm±50 mm± 810 1220 1780 2590 460 840 300 1960 2900 460 910 300 1960 3200

# FLARED END SECTIONS FOR CORRUGATED METAL AND PLASTIC PIPE CULVERTS



# FLARED END SECTION CONNECTION TO RCP

#### NOTES

- I. All 3-piece bodies to have 2.8 mm thick sides and 3.5 mm thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which
- are to be tightly joined by rivets or bolts. Reinforced edges to be supplemented with stiffener angles for the ISOO mm thru 2100 mm round, 1925 mm x 1300 mm and 2075 mm x 1425 mm pipe-orch sizes. The angles will be 51mm x 51mm x 6.4 mm for the ISOO mm thru 1800 mm round, 1925 mm x 1300 mm and 2075 mm x 1425 mm pipe-arch sizes and 64 mm  $\times$  64 mm for 1950 mm and 2100 mm round. The angles to be attached by 10 mm ø nuts and bolts.
- 3. Angle reinforcement shall be placed under the center panel seams or the 1925 mm  $\times$  1300 mm and 2075 mm  $\times$  1425 mm pipe-arch sizes.
- 4. Toe plate to be available as an accessory when specified.
- End of pipe to be finished with annular corrugations to conform flared end section so that minimal leakage results from the connection. Other designs may be used with approval of the Engineer.
- 6. For 300 mm thru 600 mm helical end section connection, a universal coupling band attached to the metal end section by rivets, bolts or 25 mm long shop tack welds spaced at same intervals as dimples may be used in place of the 0.3 m stub. See Standard Plan D97C.
- 7. The types of alternative connections for pipe to metal flared end sections shall conform to the following:

CIRCULAR PIPES -

300 mm thru 600 mm Type I or  $\scriptstyle\rm III$ 750 mm thru 2100 mm Type Ⅱ or Ⅲ

PIPE-ARCHES - 525 mm  $\times$  375 mm thru 1425 mm  $\times$  950 mm Type  $\Pi$  or  $\Pi$ 1600 mm  $\times$  1075 mm thru 2075 mm  $\times$  1425 mm Type  $\scriptstyle\rm III$ 

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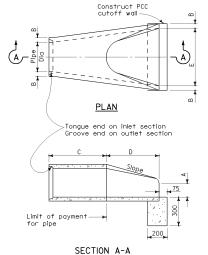
## **METAL AND PLASTIC** FLARED END SECTIONS

NO SCALE

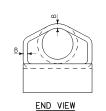
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



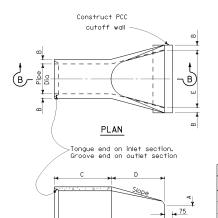




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		MINIMUM	1 DIMEN	SIONS		
PIPE DIA	Α	В	С	D	E	SLOPE
300	100	45		600	600	
450	225	58		675	910	P .
600	240	70	e 2	1100	1210	flatter
750	300	83	Note	1370	1520	
900	375	95	See	1600	1820	۶
1050	525	107	S	1600	1980	2
1200	600	119		1820	2130	_
1350	675	131		1650	2280	



SECTION B-B



END VIEW	END	VIEW
----------	-----	------

		MINIMUM	DIMEN:	SIONS		
PIPE DIA	Α	В	С	D	E	SLOPE
300	100	39		550	600	
450	225	45		630	910	P P
600	240	58	e 5	1060	1210	flatter
750	300	71	Note	1340	1520	
900	375	81	See	1570	1820	٥
1050	525	90	Ň	1600	1980	1:5
1200	600	103		1820	2130	-
1350	675	112		1670	2080	

# PRECAST CONCRETE FLARED END SECTION TYPE A

# PRECAST CONCRETE FLARED END SECTION TYPE B

#### **NOTES**

Contractor has the option of using either Type A or B precast concrete flared end section.

Limit of payment for pipe

2. C dimension varies by manufacturer and will be paid for as concrete pipe.

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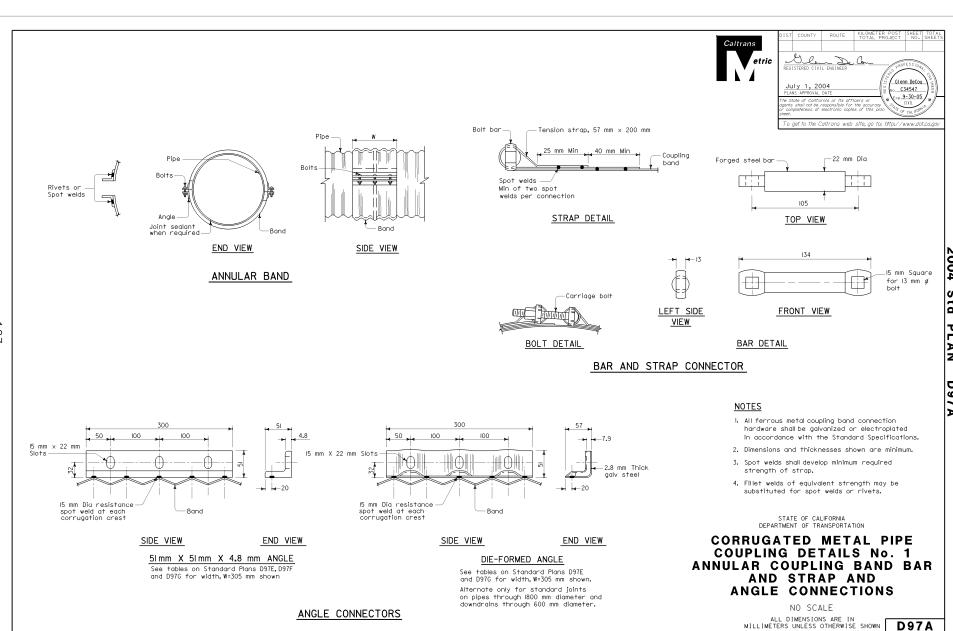
# CONCRETE FLARED **END SECTIONS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D94B







NOTES

I. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.

3. Spot welds shall develop minimum required

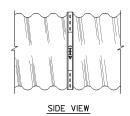
4. Fillet welds of equivalent strength may be

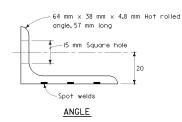
substituted for spot welds or rivets.

strength of strap.

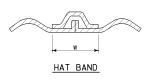
2. Dimensions and thicknesses shown are minimum.

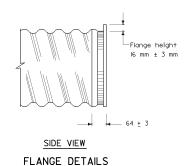
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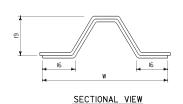


BOLT DETAIL





Required for Hat band coupler



184



13 mm ø bolt

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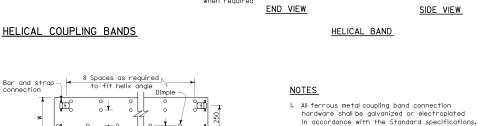
# **CORRUGATED METAL PIPE** COUPLING DETAILS No. 2 HAT BAND COUPLER AND FLANGE DETAILS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**D97B** 







SECTION THRU DIMPLES

Joint sealant when required

PLATE WASHER

TWO PIECE INTEGRAL FLANGE DIE FORMED BAND

Coupling band-

0 0 0

TOP VIEW

-Band

Joint sealant

Plate washer under head of bolt and

nut on corrugated aluminum pipe

85

Band

END VIEW

Dimension B: 178 mm min or as required to fit helix angle

SIDE VIEW

See Detail "A"

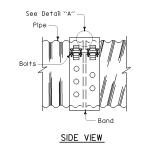
Angle connection

when required

-Washer under the nut for corrugated steel pipe

> Dimension B: 178 mm min or as required to fit helix angle. Dimension C: 68 mm min or as required to fit helix angle. (Double dimple shown for use with 413 mm bands)

#### <u>PLAN</u>



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DEPARTMENT OF TRANSPORTATION

2. Dimensions and thicknesses shown are minimum.

3. Spot welds shall develop minimum required

4. Fillet welds of equivalent strength may be

substituted for spot welds or rivets.

strength of strap.

# **CORRUGATED METAL PIPE COUPLING DETAILS No. 3** HELICAL AND UNIVERSAL **COUPLERS**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D97C

UNIVERSAL COUPLING BANDS

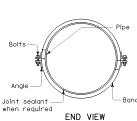
DETAIL"A"

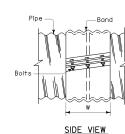
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HELICAL BAND

Caltrans

Rivets or spot welds Bolts-





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Spot welds **ANGLE** 

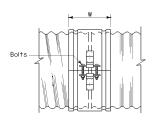
angle, 57 mm long

-15 mm Sauare hole

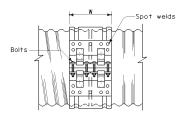
64 mm  $\times$  38 mm  $\times$  4.8 mm Hot rolled

SIDE VIEW **ANGLE** 

86



SIDE VIEW SINGLE BAR AND STRAP



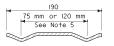
SIDE VIEW DOUBLE BAR AND STRAP

#### NOTES

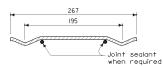
- I. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- 2. Dimensions and thicknesses shown are minimum.
- 3. Spot welds shall develop minimum required strength of strap.
- 4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
- 5. Dimension depends upon whether end condition is lips up or lips down.



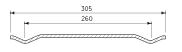
**SECTION** H-IOO HUGGER BAND



**SECTION** H-I90 HUGGER BAND



**SECTION** H-267 HUGGER BAND



**SECTION** H-305 HUGGER BAND

HUGGER COUPLING BANDS

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**CORRUGATED METAL PIPE** COUPLING DETAILS No. 4 **HUGGER COUPLING BANDS** 

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D97D



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- I. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- 3. Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of
- 4. Use 32 mm gage line dimension on attached angle leg for rivets and spot welds. 5. Band thickness shall not be less than:
- (I) 3 standard thicknesses lighter than the thickness of the pipe for Corrugated Steel Pipe.
- (II) 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 1.5 mm for Corrugated Aluminum Pipe.
- 6. Dimensions, thicknesses and strengths shown are minimum. 7. For pipe arches use same width band as for
- round pipe of equal periphery. 8. Fillet welds of equivalent strenght may be
- substituted for spot welds or rivets.
- 9. Spot welds shall develop minimum required strength of strap.
- 10. Pipe with rerolled ends having at least two  $68~\text{mm}~\times~\text{I3}~\text{mm}$  annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 68 mm  $\times$  13 mm corrugations.
- II. In the case of H-305 huggerbands, two piece bands are required for diameters through 2400 mm and three piece bands are required for diameters 2550 mm through 3000 mm.
- 12. Two piece bands are required for pipes greater than 1050 mm diameter.
- 3. The 57 mm × 51mm × 2.8 mm thick galvanized die-formed angle connector may be used in lieu of the 51mm x 51mm 4.8 mm angle connector for standard joints only on pipes through 1800 mm diameter.

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# CORRUGATED METAL PIPE COUPLING DETAILS No. 5 STANDARD JOINT

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D97E

									BAD I	AND ST	DAP			ANGL	F				<u>N</u>
										ONLY)	VAL				LTS	RIV	ETS	SPOT WELDS	١.
	PIPE	PIPE		PIPE WALL	THICKNESS	BAND TH	HICKNESS	STRAP		BAR	BAR YIELD	DIMEN	ISIONS	(No	mm ø)	ANGLE 1	TO BAND	ANGLE TO BAND	
COUPLING TYPE	CORRUGATION (mm)	SIZE (mm)	W OR A (mm)	CSP (mm)	CAP (mm)	CSP (mm)	CAP (mm)	THICKNESS (mm)	(mm ø)		STRENGTH (MPa)	CSP (mm)	CAP (mm)	CSP	CAP	CSP	CAP	CSP	2.
TWO PIECE INTEGRAL	38 × 6.5	150 - 250	178	1.32 - 2.01	1.22 - 1.52	1.32	1.52							2-10	2-10				
FLANGE		300 - 450	178	1.32 - 2.01		1.63								2-13					
	68 × I3	300 - 600	178		1.52 - 2.67	1.63	1.52							2-13	2-13				
		THROUGH 900	305	1.32 - 3.51		1.32	1.52					51 × 51 × 4.8	51 x 51 x 4.8	3-13	3-13		3-9.5 mm	3-15 mm	7
UNIVERSAL	68 × 13	1050 - 1500	305	1.32 - 4.27	1.91 - 4.17	1.32	1.52					51 x 51 x 4.8	51 × 51 × 4.8	3-13	3-13		3-9.5 mm	5-I5 mm	3
		THROUGH 1800	305	1.32 - 4.27	4.17	1.32	2.67	2.01	13	22	220	51 × 51 × 4.8	51 × 51 × 4.8	3-13	3-13	3-9.5 mm	3-9.5 mm	5-15 mm	
		1950 - 2100	413	4.27		2,01		DOUBLE 2.01	13	22	220								
		THROUGH 900	178	1.63 - 3.51		1.32	I.52	2.01	13	22	220	51 x 51 x 4.8	51 × 51 × 4.8	2-13	2-13		3-9.5 mm	3-15 mm	4
	68 × I3	1050 - 1800	305	1.63 - 4.27	1.91 - 4.17	1.32	2.67	2.01	13	22	220	51 × 51 × 4.8	51 × 51 × 4.8	3-13	3-13		3-9.5 mm	5-15 mm	
ANNULAR		1950 - 2100	305	4.27		2.01		2.77	13	22	310	51 × 51 × 4.8		3-13		3-9.5 mm		5-15 mm	5
		1200 - 2250	355	1.63 - 2.77		1.32		2.01	13	22	220	51 × 51 × 4.8		3-13		3-9.5 mm		5-15 mm	
	75 × 25	2400 - 3000	355	2.01 - 2.77		1.32		2.77	13	22	310	51 × 51 × 4.8		3-13		4-9.5 mm			
		1050 - 2700	355		1.52 - 3.43		1.52						51 × 51 × 4.8		3-13		3-9.5 mm		
		THROUGH 900	305	1.32 - 3.51	1.52 - 3.43	1.32	1.52	2.01	13	22	220	51 x 51 x 4.8	51 × 51 × 4.8	3-13	3-13		3-9.5 mm	3-15 mm	
	68 × 13	1050 - 1800	305	1.32 - 4.27	1.91 - 4.17	1.32	1.52	2.01	13	22	220	51 × 51 × 4.8	51 × 51 × 4.8	3-13	3-13		3-9.5 mm	5-I5 mm	
HELICAL		1950 - 2100	305	4.27		2.01		2.77	13	22	310	51 × 51 × 4.8		3-13		3-9.5 mm		5-15 mm	
HELIOAL		1200 - 2250	355	1.63 - 2.77		1.32		2.01	13	22	220	51 x 51 x 4.8		3-13		3-9.5 mm		5-15 mm	
	75 × 25	2400 - 3000	355	2.01 - 2.77		1.32		2.77	13	22	310	51 x 51 x 4.8		3-13		4-9.5 mm			6
		1050 - 2700	355		1.52 - 3.43		1.52						51 x 51 x 4.8		3-13		3-9.5 mm		
		300 - 1350	100	1.32 - 2.77		1.32						64 × 38 × 4.8	64 × 38 × 4.8	1-13				3-15 mm	7
		1500 - 1650	100	2.77		1.63						64 × 38 × 4.8	64 × 38 × 4.8	1-13				3-15 mm	
	68 × 13	900 - 1200	100	3.51		1.63						64 × 38 × 4.8	64 × 38 × 4.8	1-13				3-15 mm	8
	REROLLED END	THROUGH 1800	267	1.32 - 4.27		1.32		2.01	13	22	220								9
		1950 - 2100	267	4.27		2.01		2.77	13	22	310								2
	75 × 25	1200 - 2250	267	1.63 - 2.77		1.32		2.01	13	22	220								IC
HUGGER	REROLLED END	2400 - 3000	267	2.01 - 2.77		1.32		2.77	13	22	310								10
1.0002.11		1200 - 1650	190	1.63 - 2.77		1,63		2.01	13	22	220	64 × 38 × 4.8	64 × 38 × 4.8	1-13				3-15 mm	
		1800 - 2250	190	1.63 - 2.01		1.63		2.01	13	22	220	64 × 38 × 4.8	64 × 38 × 4.8	1-13				3-15 mm	
	125 x 25	1200 - 2250	190	1.63 - 3.51		1.63		2.01	13	22	220								
	REROLLED END	1200 - 3000	305 SEE	1.63 - 2.77		1.63		2.01	13	22	220								
		1200 - 2100				1.63		2.01	13	22	220								
		2250 - 3000		3.51		1.63		DOUBLE 2.01	13	22	220								- 11
		300 - 1350	70	1.32 - 2.77		1.63						64 × 38 × 4.8		1-13					
1		1500 - 1650	70	2.77		1.63							64 × 38 × 4.8	1-13				3-15 mm	
1	68 × 13	THROUGH 1050	70	3,51		1.63							64 × 38 × 4.8	1-13				3-15 mm	
	REROLLED END	THROUGH 1650	70	3,51		1.63		2.01	13	22	220	1			1				12
HAT BAND		THROUGH 1650	70	4.27		2.01		2.01	13	22	220				1				
1		1200 - 1800	70	1.63 - 2.01		1.63		2.01	13			64 × 38 × 4.8		1-13	1			3-15 mm	13
1	75 × 25	1950 - 2250	70	1.63 - 2.01		1,63				_		64 × 38 × 4.8		1-13				3-15 mm	
	REROLLED END	1200 - 1650	70	2.77		1.63				_		64 × 38 × 4.8		1-13		1		3-15 mm	
1		1800 - 2700	70	2.77		2.01		2.77	13	22	220	01 × 30 × 4.0	1	. 13		1		3 13 111111	
	1	1.000 2100	10	4.11		2.01		2.11	1 12		440	1	I		1				

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	DIDE	DIDE		DIDE WALL	THICKNESS	BAND TH	JICKNESS	CTD.D	(CSP	ONLY)	0.0 255.0	DIME	NSIONS		ILTS mm ø )		/ETS TO BAND	SPOT WELDS
COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS		BAR YIELD STRENGTH	CSP	CAP	CSP	CAP	CSP	CAP	CSP
THE	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm ø)	(mm)	(MPa)	(mm)	(mm)	031	CAI	(mm)	(mm)	(mm)
TWO PIECE INTEGRAL	38 × 6.5	150-250	178	1.63-2.01	1.52	1.63	1.52							2-10	2-10			
FLANGE	68 × I3	300-600	305		1.52-2.67		1.52								3-13			
UNIVERSAL	68 × 13	THROUGH 900	305	1.63-3.51	1.52-3.43	1.63	1.52	2.01	13	22	220	51 x 51 x 4.8	51 x 51 x 4.8	3-13	3-13	3-9.5	3-9.5	5-15
UNIVERSAL	90 X IJ	1050-1500	413	1.63-4.27	1.52-4.17	1.63	1.52	DOUBLE 2.01	13	22	220	51× 51× 6.4	51 x 51 x 6.4	4-13	4-13	5-9.5	5-9.5	
		THROUGH 900	305	1.63-3.51	1.52-3.43	1.63	1.52					51 × 51 × 4.8	51 x 51 x 4.8	3-13	3-13	3-9.5	3-9.5	5-15
		1050-1500	305	1.63-2.01		1.63						51× 51× 4.8		3-13		3-9.5		5-15
	68 × 13	1050-1500	305	2.77-4.27	3.43-4.17	1.63	1.91					51× 51× 6.4	51× 51× 6.4	3-13	3-13	5-9.5	5-9.5	
	00 x 13	1650-1800	610		4.17		2.67						51 x 51 x 6.4		5-13		5-13	
		1650-2100	610	2.77-4.27		1.63						51× 51× 6.4		5-13		7-9.5		
ANNULAR		1050-1350	305		1.52-2.67		1.52						51 × 51 × 4.8		3-13		3-9.5	
		1200-1500	355	1.63-2.01		1.63						51 × 51 × 4.8		3-13		3-9.5		5-15
		1200-1500	355	2.77		1.63						51 × 51 × 4.8		3-13		5-9.5		
		1650-3000	635	1.63-2.77		1.63						51× 51× 4.8		5-13		9-9.5		
	75 × 25	1050-1500	355		1.52-2.67		1.52						51 × 51 × 4.8		3-13		5-9.5	
		1050-1500	355		3.43		1.91						51 × 51 × 6.4		3-13		5-9.5	
		1650-2400	635		1.52-3.43		1.52						51 × 51 × 6.4		5-13		7-9.5	
		2400-2700	635		3.43		1.91						51 x 51 x 6.4		5-13		7-9.5	
		THROUGH 900	305	1.63-3.51	1.52-3.43	1.63	1.52					51× 51× 4.8	51 × 51 × 4.8	3-13	3-13	3-9.5	3-9.5	5-15
		1050-1350	305		1.52-2.67		1.52						51 x 51 x 4.8		3-13		3-9.5	
	68 × 13	1050-1500	305	1.63-2.01		1.63						51 × 51 × 4.8		3-13		3-9.5		5-15
	66 X IS	1050-1500	305	2.77-4.27	3.43-4.17	1.63	1.91					51× 51× 6.4	51 × 51 × 6.4	3-13	3-13	5-9.5	5-9.5	
		1650-2100	610	2.77-4.27		1.63						51× 51× 6.4		5-13		7-9.5		
1		1650-1800	610		4.17		2.67						51 × 51 × 6.4		5-13		5-9.5	
HELICAL		1200-1500	355	1.63-2.01		1.63						51× 51× 4.8		3-13		3-9.5		5-15
1		1200-1500	355	2.77		1.63						51 × 51 × 4.8		3-13		5-9.5		

1.63

1.52

1.91

1.52

1.91

1.52-2.67

3.43

1.52-3.43

3.43

 $\infty$ 

1650-3000

1050-1500

1050-1500

1650-2400

2400-2700

75 × 25

635

355

355

635

635

1.63-2.77

က

BAR AND STRAP

51 x 51 x 4.8

#### <u>NOTES</u>

ANGLE

5-13

51× 51× 4.8

51 × 51 × 6.4

51 x 51 x 6.4

51 × 51 × 6.4

3-13

3-13

5-13

5-13

9-9.5

5-9.5

5-9.5

7-9.5

7-9.5

- I. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- 2. For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- 3. Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of
- 4. Use 32 mm gage line dimension on attached angle leg for rivets and spot welds.
- 5. Band thickness shall not be less than:
  - (I) 3 standard thicknesses lighter than the thickness of the pipe for corrugated steel pipe.
  - (II) 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 1.5 mm for corrugated aluminum pipe.
- 6. Dimensions, thicknesses and strengths shown are minimum.
- 7. For pipe arches use same width band as for round pipe of equal periphery. 8. Fillet welds of equivalent strength may be
- substituted for spot welds or rivets.
- Spot welds shall develop minimum required strength of strap.
- 10. Pipe with rerolled ends having at least two 68 mm x 13 mm annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 68 mm  $\times$  13 mm corrugations.
- II. In the case of H-305 huggerbands, two piece bands are required for diameters through 2400 mm and three piece bands are required for diameters 2550 mm through 3000 mm.
- 12. Two piece bands are required for pipes greater than 1050 mm diameter.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

## **CORRUGATED METAL PIPE COUPLING DETAILS No. 6 POSITIVE JOINT**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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POSITIVE JOINTS

								BAR AND STRAP (CSP ONLY)				ANGLE						
COUPLING	PIPE	PIPE	W OR A	PIPE WALL	THICKNESS	BAND TI	HICKNESS	STRAP	BOLTS	BAR DIA	BAR YIELD	DIMEN	ISIONS	BOL (Nom		RIVE ANGLE		SPOT WELDS ANGLE TO BAND
TYPE	CORRUGATION (mm)	SIZE (mm)	(mm)	CSP (mm)	CAP (mm)	CSP (mm)	CAP (mm)	THICKNESS (mm)	(mm ø)	(mm)	STRENGTH (MPa)	CSP (mm)	CAP (mm)	CSP	CAP	CSP	CAP	CSP
		THROUGH I200	267	2.77		1.63		2.01	13	22	220							
		1350 - 1650	267	2.77		1.63		DOUBLE 2.01	13	22	220							
	68 × I3 REROLLED END	THROUGH 1350	267	1.63 - 2.01		1.63		2.01	13	22	220							
,,,,coeb	KENOLLED END	THROUGH I500	267	3.51		2.01		DOUBLE 2.01	13	22	220							
HUGGER		1650 - 1800	267	3.51		2.77		DOUBLE 2.01	13	22	220							
		THROUGH 1800	267	4.27		2.77		DOUBLE 2.77	13	22	310							
		1200 - 2100	267	2.77		2.01		DOUBLE 2.01	13	22	220							
	75 × 25	1200 - 2250	267	1.63 - 2.01		1.63		DOUBLE 2.01	13	22	220							
	REROLLED END	2400 - 2550	267	2.01		2.01		DOUBLE 2.01	13	22	220							
		2250 - 3000	267	2.77		2.77		DOUBLE 2.77	13	22	310							
		300 - 750	70	1.63 - 2.01		1.63						64 × 38 × 4.8		1-13				3-15 mm
HAT BAND	68 × 13	900 - 1200	70	I.63		1.63						64 × 38 × 4.8		1-13		3-12.7 mm		3-15 mm
	REROLLED END	900 - 1200	70	2.01		2.01		2.01	13	22	220							
	MENOCECO ENO	THROUGH 1050	70	2,77		2.01		2.01	13	22	220						(	

DOWNDRAIN

									AND STR SP ONLY)				А	NGLE			
COUPLING		PIPE	W OR A	PIPE WALL	THICKNESS	BAND TH	HICKNESS	STRAP	BOLTS	BAR DIA	DIMEN	ISIONS		LTS ·mm ø)	RIVI ANGLE	ETS TO BAND	SPOT WELDS ANGLE TO BAND
TYPE	CORRUGATION (mm)	SIZE (mm)	(mm)	CSP (mm)	CAP (mm)	CSP (mm)	CAP (mm)	THICKNESS (mm)	(mm Ø)	(mm)	CSP (mm)	CAP (mm)	CSP	CAP	CSP	CAP	CSP
TWO PIECE INTEGRAL	38 × 6.5	150	178	1.63 - 4.27		1.32							3-10				
FLANGE	38 × 6.5	200 - 250	178	1.63 - 4.27	1.52 - 4.17	1.63	1.52						3-10	3-10			
ANNULAR	68 × 13	THROUGH 600	305	1.63 - 4.27	1.52 - 4.17	1.63	1.52				51 × 51 × 4.8	5l × 5l × 4.8	3-13	3-13	3-9.5 mm	3-9.5 mm	3-15 mm
HUGGER	68 × I3 REROLLED END	THROUGH 600	267	1.63 - 4.27		1.63		2,01	13	22	5I × 5I × 4.8	51 × 51 × 4.8	3-13	3-13	3-9.5 mm	3-9.5 mm	3-15 mm

#### NOTES

- All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- Tension straps may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
- 4. Use 32 mm gage line dimension on attached angle leg for rivets and spot welds.
- 5. Band thickness shall not be less than:
  (1) 3 standard thickness lighter than the thickness of the pipe for corrugated steel pipe.
  (11) 2 standard thickness lighter than the thickness of the pipe and in no case lighter than 1.5 mm for corrugated aluminum pipe.
- 6. Dimensions, thickness and strengths shown are minimum.

- For pipe arches use same width band as for round pipe of equal periphery.
- 8. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
- 9. Spot welds shall develop minimum required strength of strap.
- 10. Pipe with rerolled ends having at least two 68 mm x 13 mm annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same dlameter and wall thickness and having 68 mm x13 mm corrugations.
- II. Two piece bands are required for pipes greater than 1050 mm diameter.
- 12. For downdrain applications, two piece integral flange couplers shall have factory applied sleeve type rubber gaskets with a minimum length pf 175 mm measured along the length of the pipe.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

# CORRUGATED METAL PIPE COUPLING DETAILS No. 7 POSITIVE JOINTS AND DOWNDRAIN

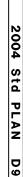
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

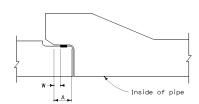
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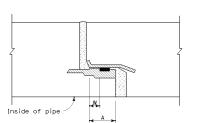
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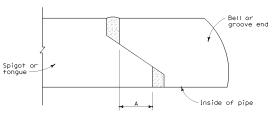


# CONCRETE JOINT-FLARED BELL DESIGN

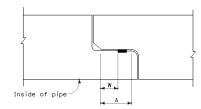


STEEL JOINT-FLUSH BELL DESIGN

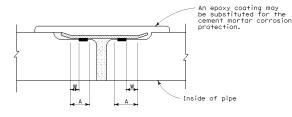
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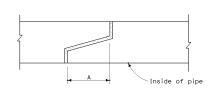
SELF-CENTERING TONGUE & GROOVE



CONCRETE JOINT-FLUSH BELL DESIGN



CONCRETE JOINT-DOUBLE GASKET DESIGN



**TONGUE & GROOVE DESIGN** 

#### TABLE A

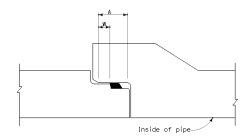
	MINIMUM JOINT OVERLAP					
PIPE DIAMETER LIMITS	Standard "A"	Positive "A"	Standard "W"	Positive "W"		
150 mm through 300 mm	6 mm	13 mm	6 mm	9 mm		
375 mm through 825 mm	13 mm	19 mm	6 mm	13 mm		
Greater than 825 mm	19 mm	25 mm	9 mm	16 mm		

#### LEGEND



Steel





Caltrans

#### CONCRETE JOINT-SINGLE OR DOUBLE OFFSET DESIGN

(Flared or Flush Bell)

#### <u>NOTES</u>

- 1. For pipe sections installed on straight alignment, the pipe sections shall be joined to provide maximum joint overlap at all points on the joint periphery, but in no case less than the values shown in Table A for "W" if the installation is required to be watertight or "A" for all other installations.
- 2. For pipe sections installed on curved alignment, the pipe sections shall be joined to provide maximum joint overlap on one side of the joint and not less than 6 mm overlap on the other. The 6 mm overlap shall be the "W" dimension for installations required to be watertight, or the "A" dimension for all other installations.
- 3. Watertight joint requirement shall typically be met with the use of rubber gaskets as shown (See Standard Specifications 61-1.02 and 65-1.06). Pipe installed with rubber gaskets shall have a minimum overlap meeting or exceeding the indicated "W" dimension shown in Table A or indicated in Note 2. Joints shown with rubber gaskets may be installed without gaskets in non-watertight applications, in which case the joint shall be sealed with sealing materials described in Standard Specifications 65-1.06, and the minimum joint overlap shall meet or exceed the "A" dimension shown in Table A or indicated in Note 2.
- 4. For Self-Centering Tongue and Groove Joints, the mortar shall be applied after the pipe ends are pushed together. The mortar shall be applied to the joint gap on the inside of the pipe for pipe diameters of 600 mm or more, or to the gap on the outside of the pipe for pipe smaller than 600 mm in diameter.
- 5. When watertight joints are required (See Note 3) and cement mortar joints are not allowed, the taper on surfaces within the "W" dimension at full joint closure and the opposing sealing surfaces of the bells and spigots on which the rubber gaskets may bear during closure of the joint and at any degree of partial closure shall form an angle of not more than 2 degrees with the longitudinal axis of the pipe.

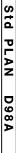
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DEPARTMENT OF TRANSPORTATION

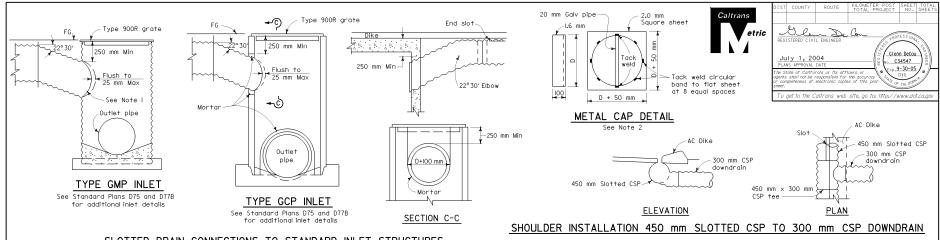
REINFORCED CONCRETE PIPE OR NON-REINFORCED CONCRETE PIPE STANDARD AND POSITIVE JOINTS

NO SCALE

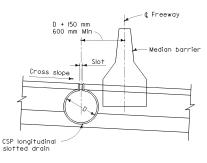
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# SLOTTED DRAIN CONNECTIONS TO STANDARD INLET STRUCTURES

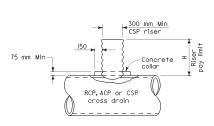


#### TYPICAL CROSS SECTION

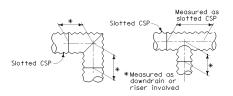
#### NOTES

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- I. Either field joint sealed with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of I part portland cement, 3-5 parts sand and 1/2 parts SSI emulsified asphalt), or continuous weld.
- 2. "D" equals nominal pipe diameter.
- 3. Length of elbows and tees is included in the linear meter of pipe involved shown on the Drainage List of the project plans.
- 4. Watertight joints required on all slotted CSP connections.

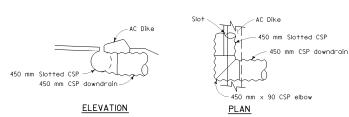


#### RISER CONNECTION DETAIL

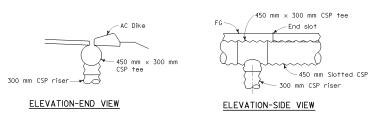


MEASUREMENT OF CORRUGATED STEEL PIPE ELBOWS AND TEES USED WITH SLOTTED DRAINS

See Note 3



#### SHOULDER INSTALLATION 450 mm SLOTTED CSP TO 450 mm CSP DOWNDRAIN



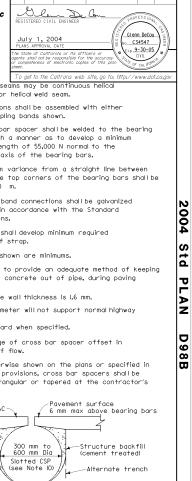
SHOULDER INSTALLATION 450 mm SLOTTED CSP TO 300 mm CSP RISER

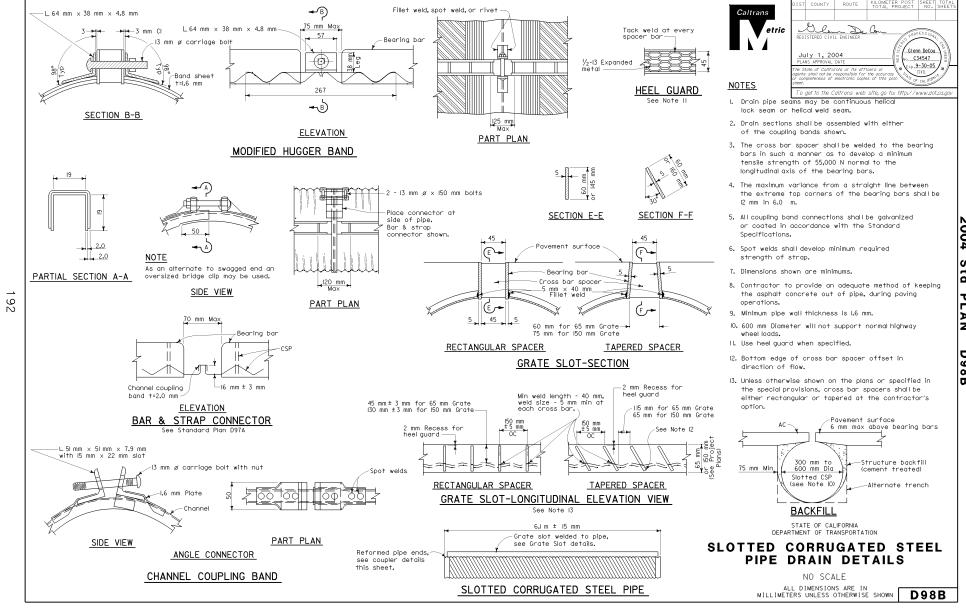
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

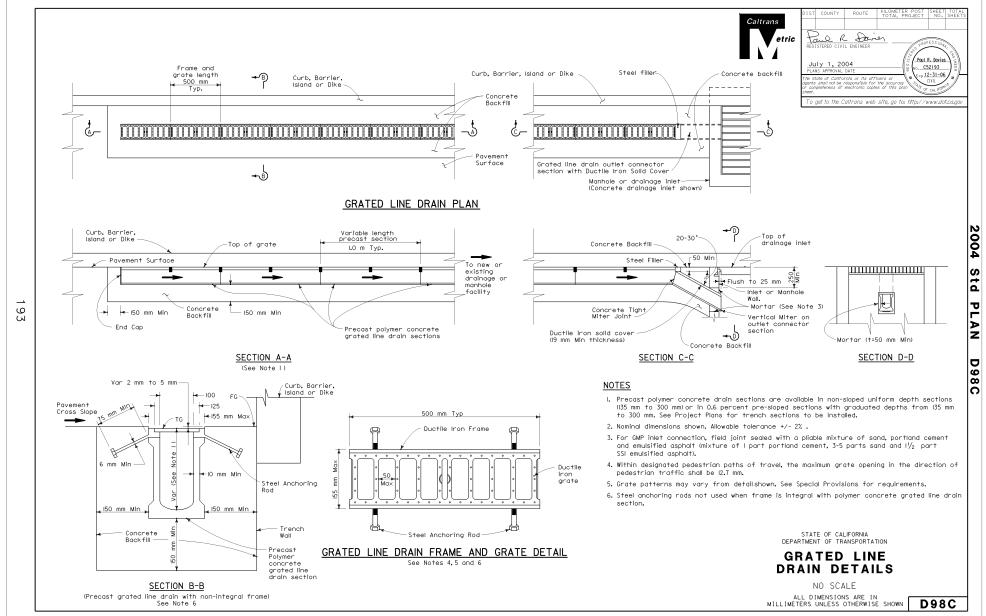
# SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS

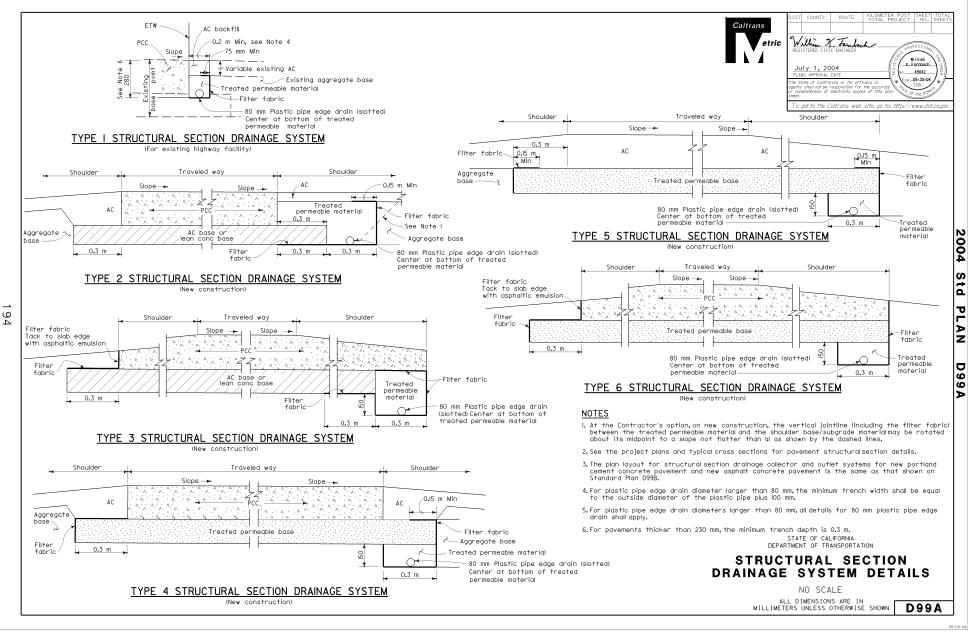
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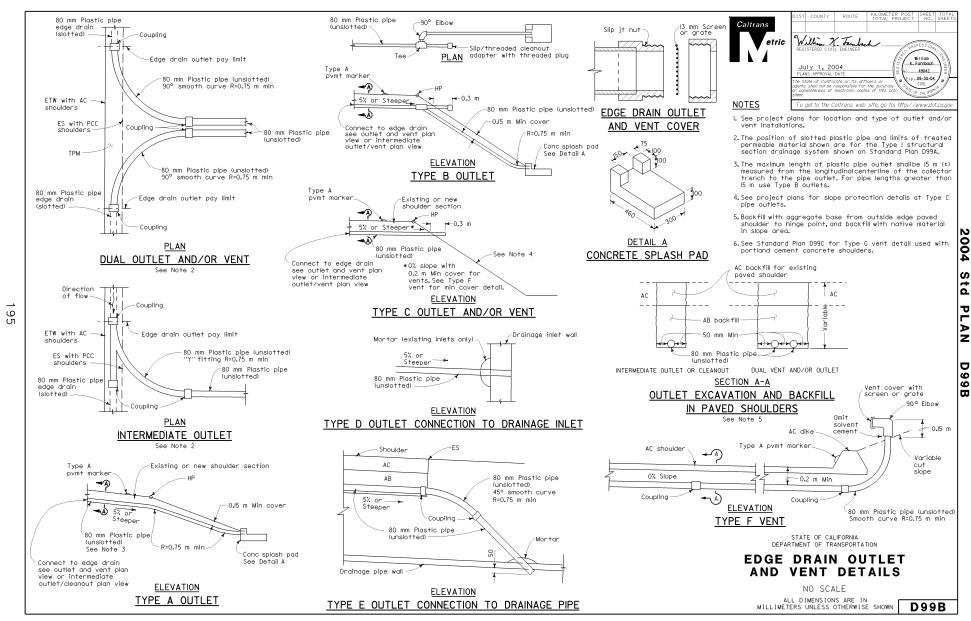
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

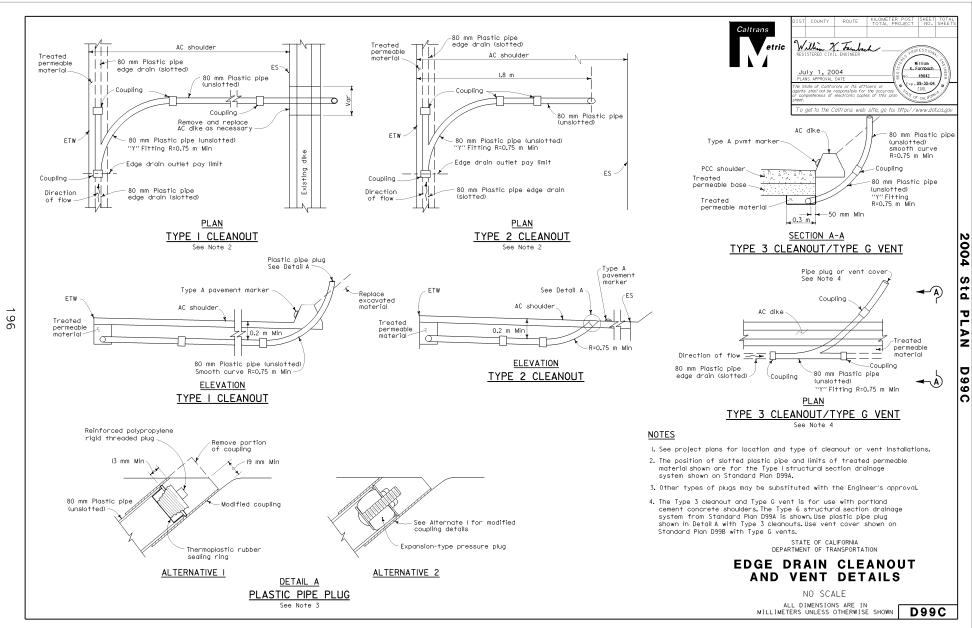


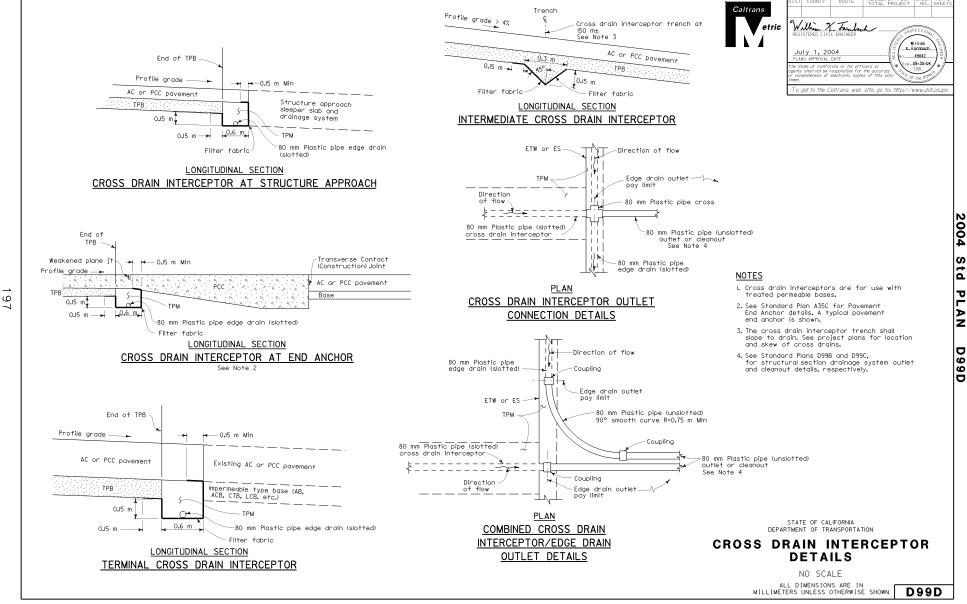
















"Corner"
outside Face
exposed
Gabion

Internal
Connecting
Wires

Internal
Connecting
Wires

STANDARD GABION SIZES								
LETTER	LENGTH	WIDTH	HEIGHT	NUMBER OF	VOLUME			
CODE		m		DIAPHRAGMS	m3			
Α	2	_	_	I	2.0			
В	3	I	1	2	3.0			
С	4	- I	- 1	3	4.0			
D	2	- 1	0.5	1	1.0			
E	3	- I	0.5	2	1.5			
F	4	- 1	0.5	3	2.0			
G	2	I	0.3	1	0.6			
Н	3	I	0.3	2	0.9			
I.	4	I	0.3	3	1.2			

Mesh need not be twisted. See typical acceptable mesh styles.

Base

A m uength

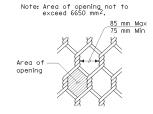
TYPICAL GABION BASKET

FRONT VIEW

13.5-GAGE INTERNAL CONNECTING WIRES

√0.33 m

98



# TWISTED MESH Nominal 75-85 mm C-C WELDED MESH TYPICAL ACCEPTABLE MESH STYLES

#### NOTES

- Internal connecting wire (13.5-gage) to be installed across width of interior Gabions and across width and length of end Gabions.
- Internal connecting wire and Gabion mesh shall be galvanized.
- Internal connecting wires required on all gabions I m high.
- Preformed stiffeners (II-gage or 9-gage) are an acceptable differentive to internal connecting wires, install them as recommended by manufacturer or as directed by the Engineer at 1/3 points.
- Place rock in end Gabion cell first, and continue by filling interior Gabion cells.
- 6. For Gabion dimensions, refer to table "Standard Gabion Sizes".

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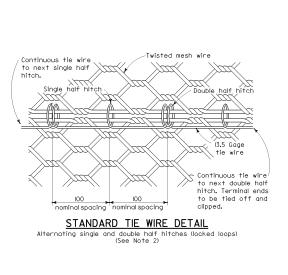
#### GABION BASKET DETAILS No. 1

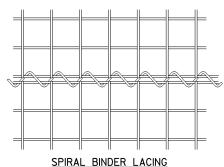
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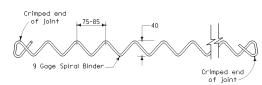
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

D100A









STANDARD SPIRAL BINDER (See Note 2)



Wire diameter 3.05 mm



Before closure INTERLOCKING FASTENER

After closure



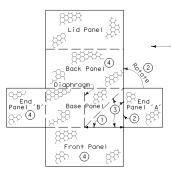
Before closure

After closure

OVERLAPPING FASTENER

#### ALTERNATIVE GABION JOINT MATERIAL FASTENERS

(Fastener dimensions nominal) (See Notes 3 and 4)



FLAT LAYOUT OF GABION BASKET

To Assemble Transitional Gabion Basket:

Step 1 Cut mesh along joint between Front Panel and Base Panel.

Step(2) Unfasten End Panel 'A' from Base Panel and rotate End Panel 'A'. Fasten End Panel Panel 'A' to Back Panel.

Step (3) Fold the cut portion of the Base Panel into upright position along diagonal from the diaphragm to the corner of the Back Panel.

(Step 4) Fold the Back Panel, Front Panel and End Panel 'B' into upright positions. Fasten End Panel 'B' to the Back Panel and the Front Panel.

Step (5) Rotate End Panel 'A' and the cut portion of the Front Panel inward against the upturned portion of the Base Panel Faster along the overlapped portion of the Front Panel and End Panel 'A'. Faster the overlapped portion of the Front Panel and End Panel 'A' to the folded upright portion of the Base Panel along. the diagonal (described in Step 3).

Step 6 Fill the Transitional Gabion Basket with rock as per specifications.

Step 7 Close Iid and fold over corner of Lid Panel. Fasten along Lid Panel edges.

#### TRANSITIONAL GABION BASKET

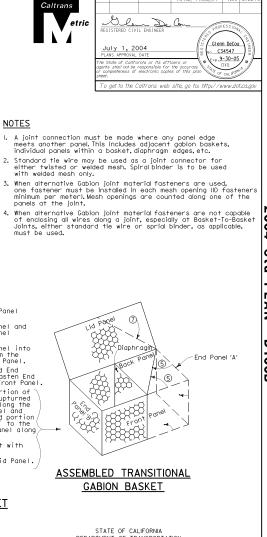
(For 2 m: 3 m: or 4 m gabion)

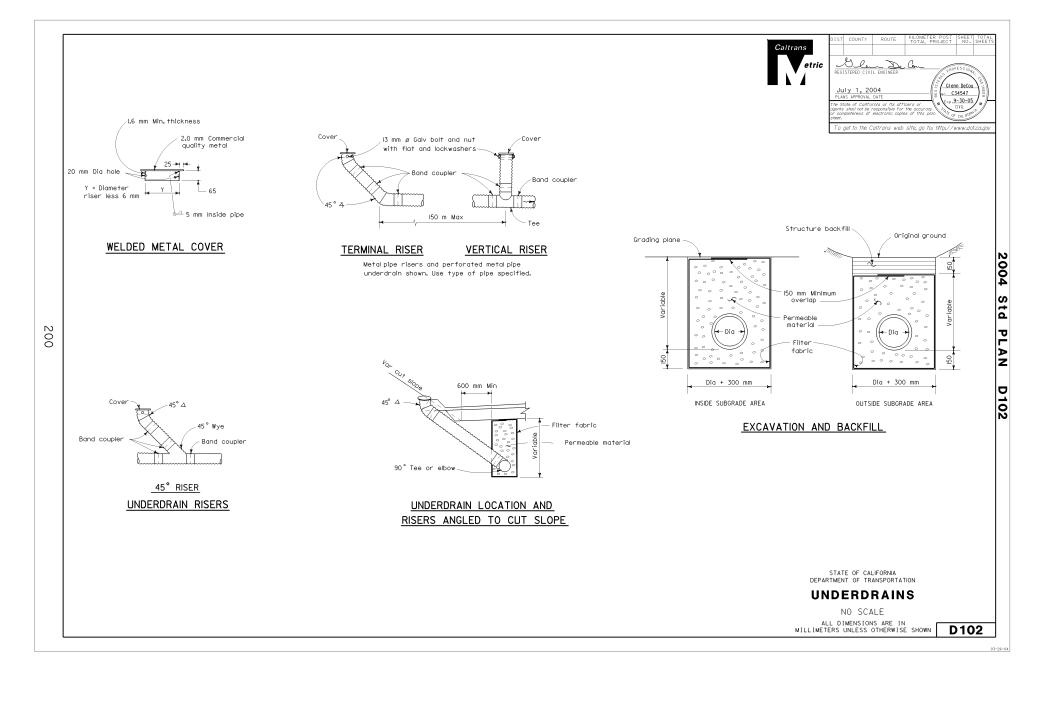
DEPARTMENT OF TRANSPORTATION

#### GABION BASKET DETAILS No. 2

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN D100B





FOR ADDITIONAL ABBREVIATIONS,

SEE STANDARD PLANS A10A AND A10B.

EST

ESTB

ETW

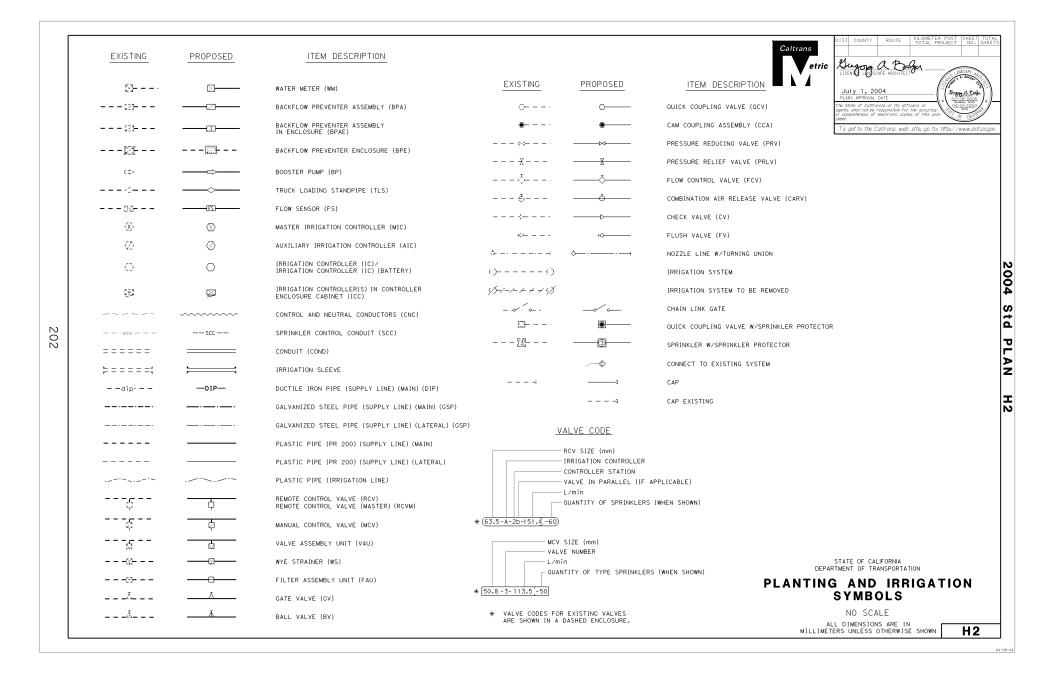
establishment

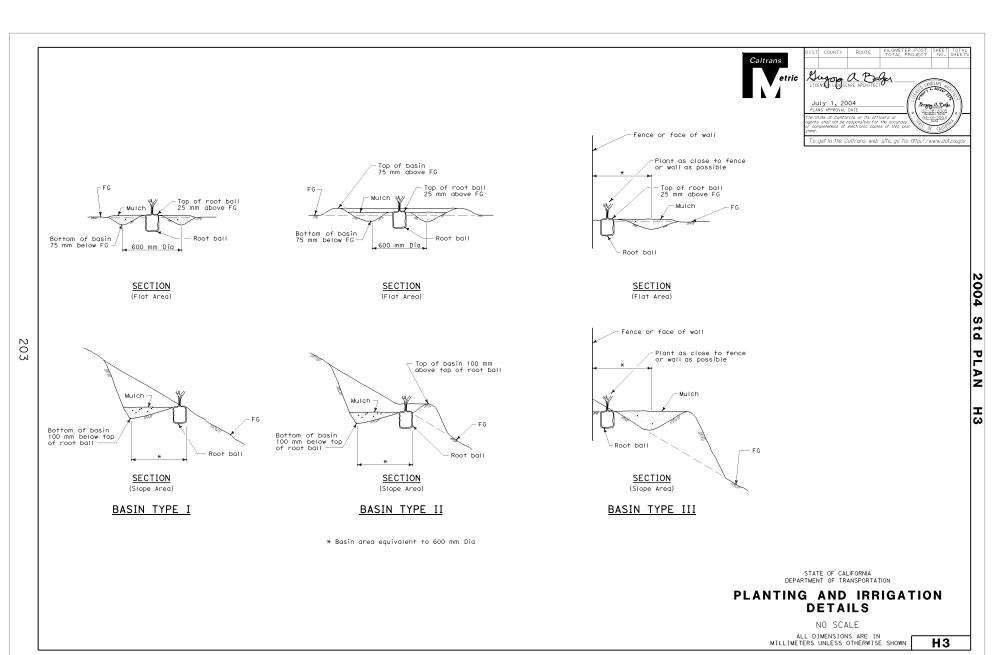
edge of traveled way

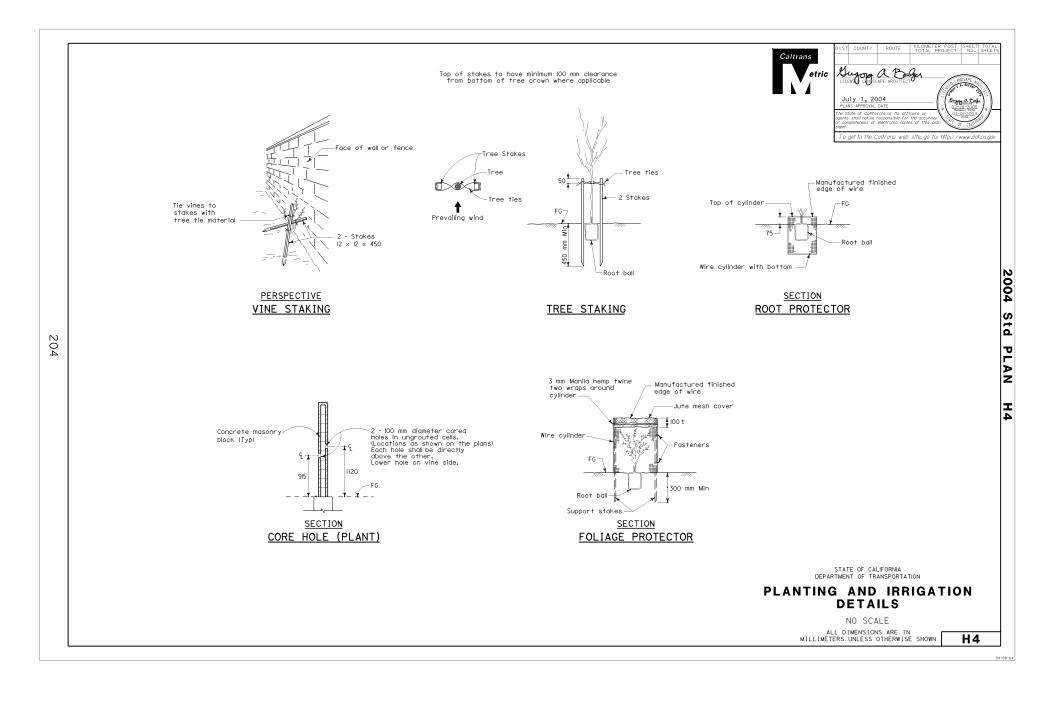
H1

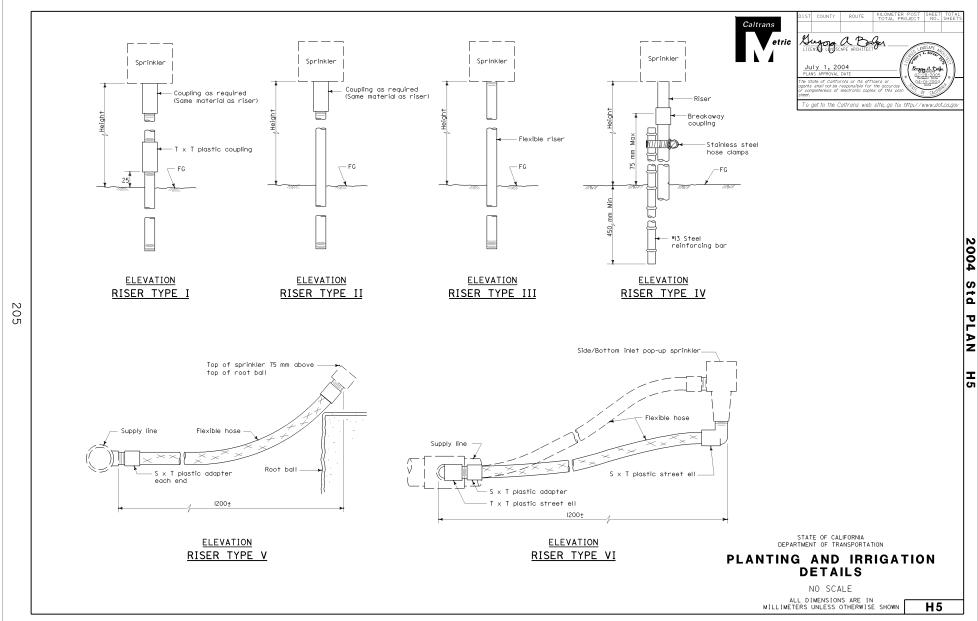
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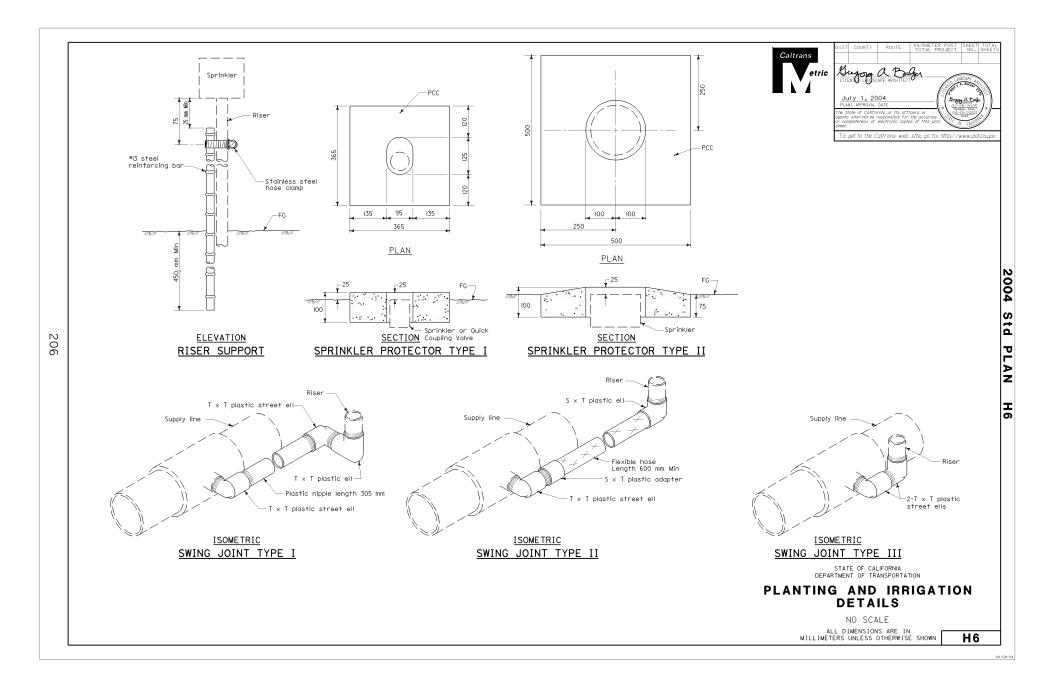
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

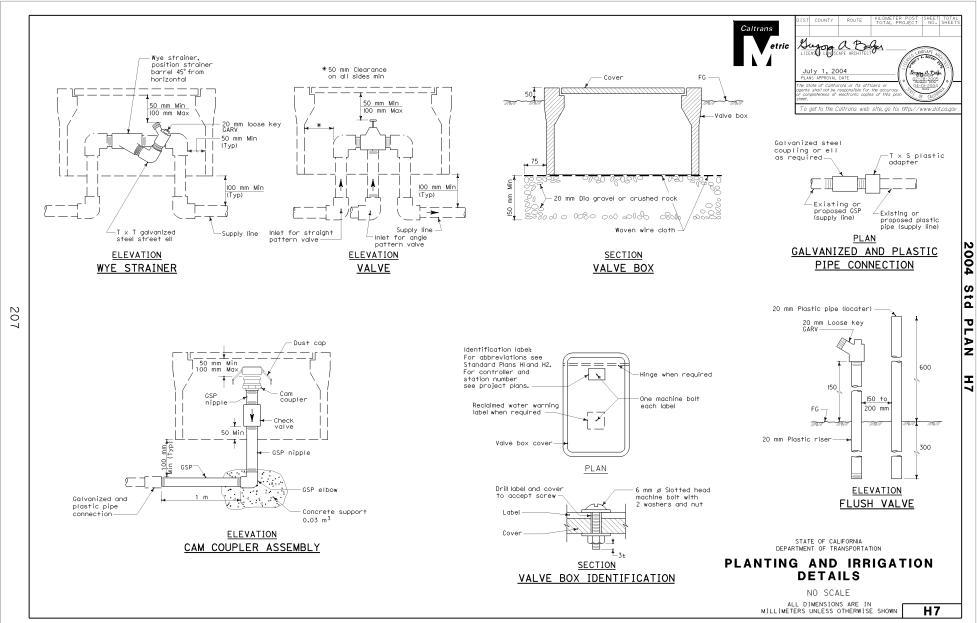












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Two Piece

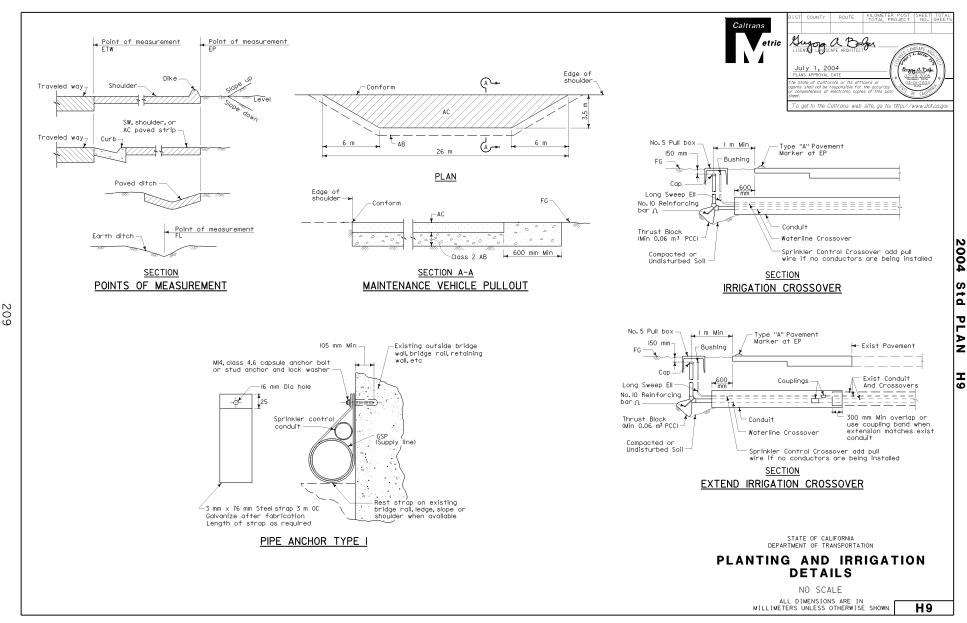
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

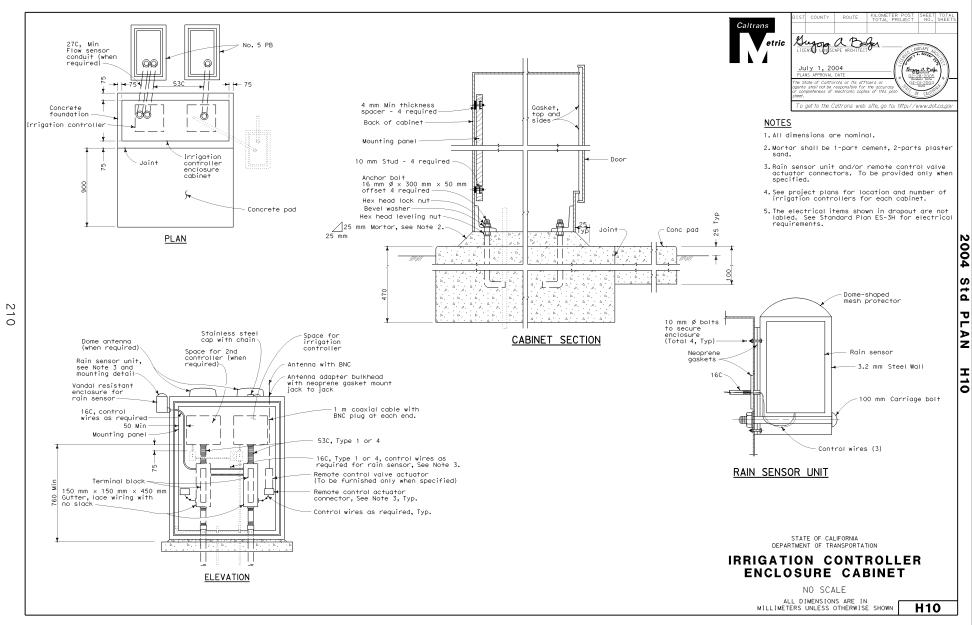
#### PLANTING AND IRRIGATION **DETAILS**

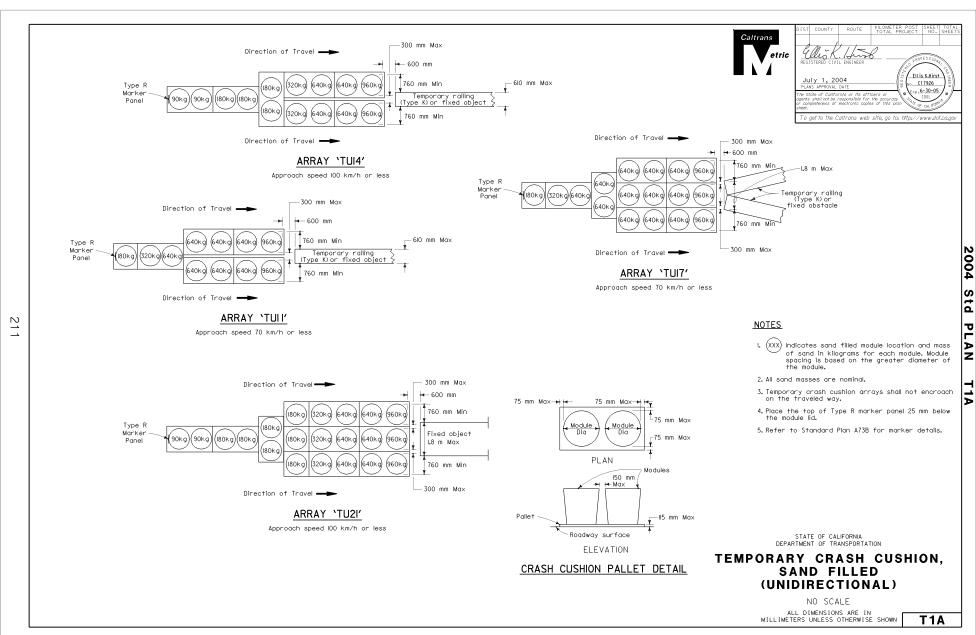
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

H8











ROUTE KILOMETER POST TOTAL PROJECT Ellis K.Hirst . C17926 ×р\_6-30-05 he State of California or its officers or get to the Caltrans web site, go to: http://www.dot.ca.g

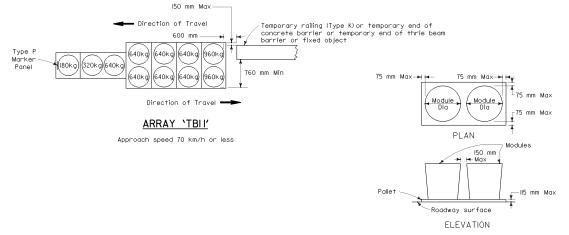
150 mm Max-Direction of Travel Temporary railing (Type K) or temporary end of concrete barrier or temporary end of thrie beam barrier or fixed object 600 mm \_ Type P 640kg) (960kg Marker (180kg)(180kg) 90kg)(90kg) 760 mm Min 640kg 640kg) (960kc

Direction of Travel

#### ARRAY 'TBI4'

Approach speed IOO km/h or less

 $\sim$ 



CRASH CUSHION PALLET DETAIL

#### **NOTES**

- I. (XXX) Indicates sand filled module location and mass of sand in kilograms for each module. Module spacing is based on the greater diameter of
- 2. All sand masses are nominal.
- 3. Temporary crash cushion arrays shall not encroach on the traveled way.
- 4. Place the Type P marker panel so that the bottom of the panel rests upon the pallet.
- 5. Refer to Standard Plan A73B for marker details.

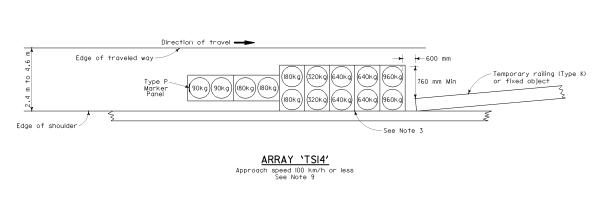
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

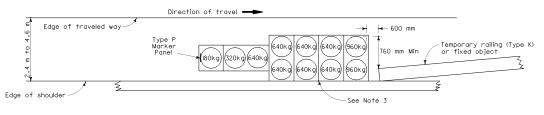
#### TEMPORARY CRASH CUSHION, SAND FILLED (BIDIRECTIONAL)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

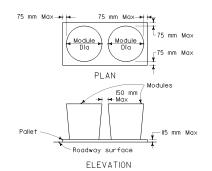
T<sub>1</sub>B





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## ARRAY 'TSII' Approach speed 70 km/h or less See Note 9



CRASH CUSHION PALLET DETAIL





#### NOTES

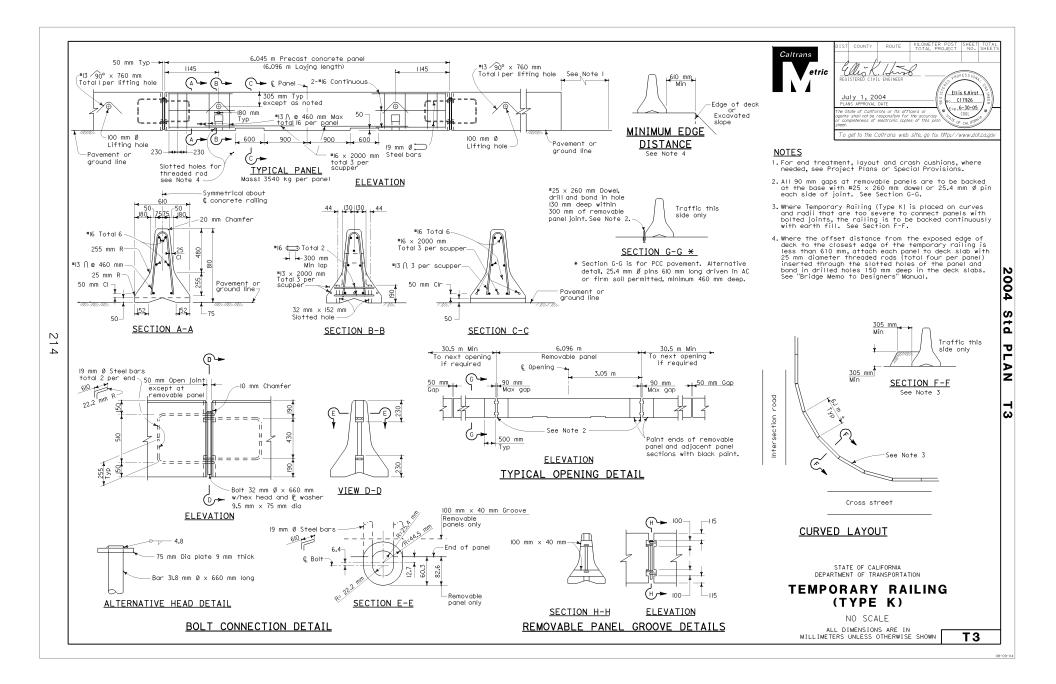
- I.  $\overbrace{\rm XXX}$  Indicates sand filled module location and mass of sand in kilograms for each module. Module spacing is based on the greater diameter of the module.
- 2. All sand masses are nominal.
- The temporary crash cushion arrays shown on this plan shall be used only in locations where there will be traffic on one side of the temporary crosh cushion array.
- If the fixed object or approach end of the temporary railing is less than 4.60 meters from the edge of traveled way, a temporary crash cushion is required.
- 5. Temporary crash cushion arrays shall not encroach on the traveled way.
- 6. Arrays for median shoulders shall conform to details shown on this plan for outside shoulders.
- 7. Place the Type P marker panel so that the bottom of the panel rest upon the pallet and faces traffic.
- 8. Refer to Standard Plan A73B for marker details.
- 9. For shoulder widths less than 2.4 m, appropriate approved crash cushion protection, other than sand filled modules, shall be provided at fixed objects and at approach ends of temporary railing. The specific type of crash cushion shall be as shown on the project plans or as specified in the Special Provisions, or if not shown on the project plans or specified in the Special Provisions, shall be as approved by the Engineer.
- 10.Approach speeds indicated conform to NCHRP 350 Report criteria.

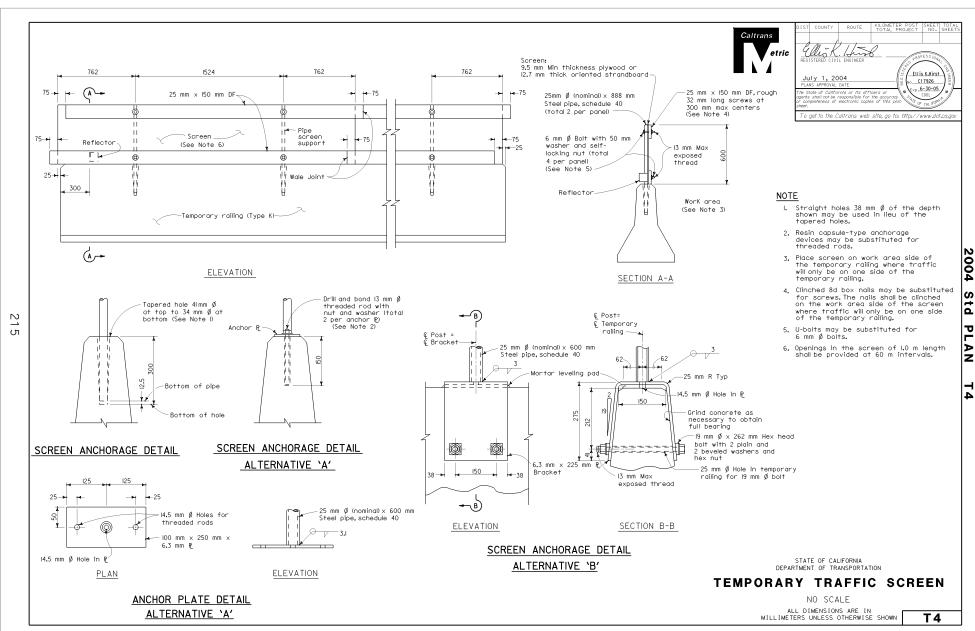
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

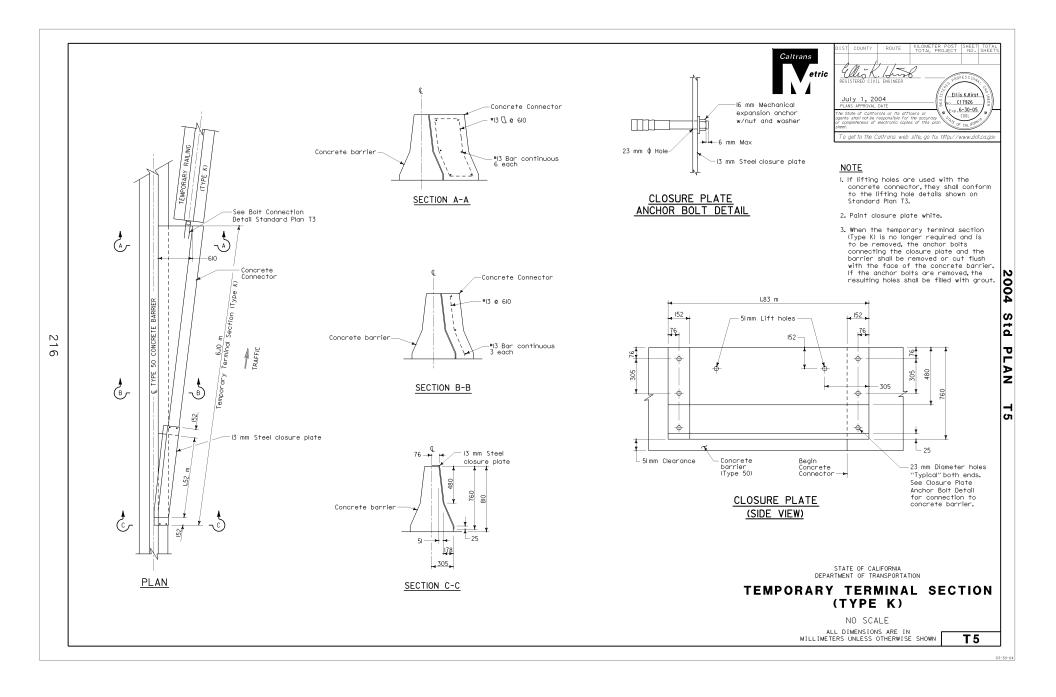
#### TEMPORARY CRASH CUSHION, SAND FILLED (SHOULDER INSTALLATIONS)

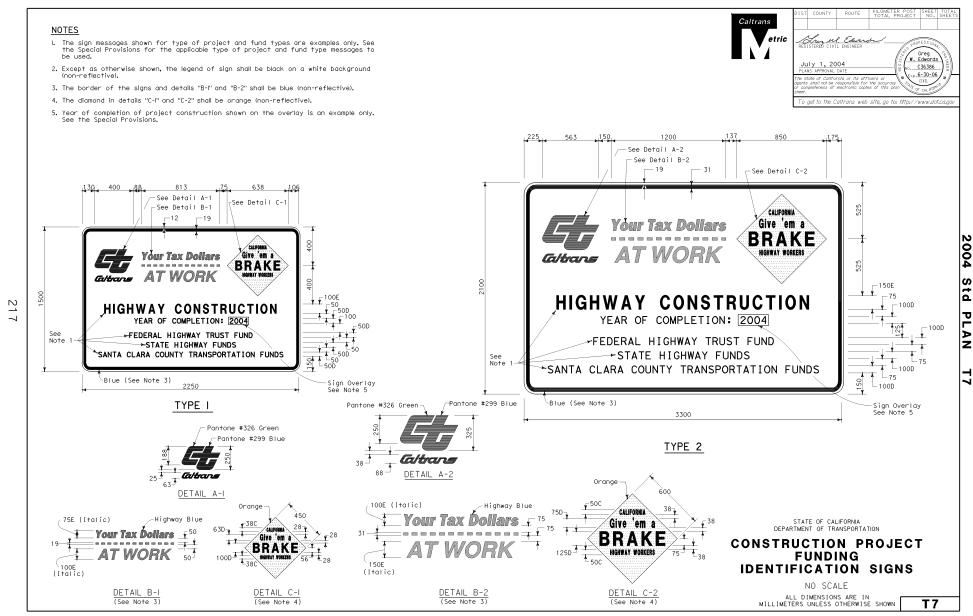
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

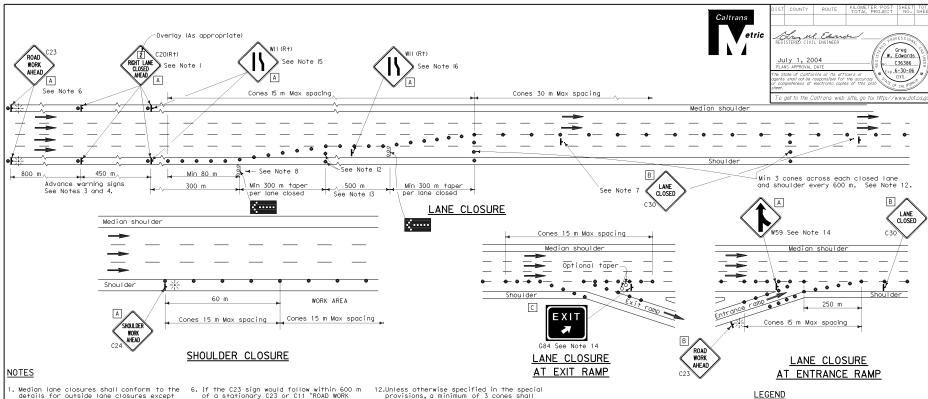












- details for outside lane closures except that C20 (Lt) signs shall be used.
- At least one person shall be assigned to provide full time maintenance of traffic control devices for lane closures.
- 3. Duplicate sign installations are not
  - a) On opposite shoulder if at least one-half of the available lanes remain open to traffic.
  - b) In the median if the width of the median shoulder is less than 2.4 m and the outside lanes are to be closed.
- 4. Each advance warning sign on each side of the roadway shall be equipped with at least two flags for daytime closure. Each flag shall be at least 400 mm x 400 mm in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
- A C14 "END ROAD WORK" sign, as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within a larger project's

- 6. If the C23 sign would follow within 600 m of a stationary C23 or C11 "ROAD WORK NEXT \_\_\_\_ MILES", use a C20 sign for the first advance warning sign.
- 7. Place a C30 sign every 600 m throughout length of lane closure.
- One flashing arrow sign for each lane closed. The first flashing arrow sign shall be Type I. All others may be either Type I or Type II.
- 9. A minimum 450 m of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at top of crest vertical curve or on a horizontal curve.
- 10.All cones used for lane closures during the hours of darkness shall be fitted with retroreflective bands (or sleeves) as specified in the specifications.
- 11.Portable delineators, placed at one-balf the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
- 2.Unless otherwise specified in the special provisions, a minimum of 3 cones shall be placed transversely across each closed lane and shoulder at each location where a taper across a traffic lane ends and every 600 m as shown on the "Lane across a detail two Type II barrens. The transverse alignment of the cones or barricades on the closed shoulder may be shifted from the transverse alignment to shifted from the transverse alignment to provide access to the work.
- 13.Unless otherwise specified in the special Juniess officerises specified in the special provisions, the 500 m tangent shown along lane lines shall be used between the 300 m tapers required for each closed traffic
- 14.Unless otherwise specified in the special provisions, the G84 and W59 signs shall be used as shown.
- 15.When specified in the special provisions, a W11 "LANE ENDS" symbol sign is to be used in place of the C20 "RIGHT LANE CLOSED AHEAD" sign.
- 16.The W11 "LANE ENDS" symbol sign shown at this location is to be used where the W11 sign is used as advance warning as described in Note 15.

#### SIGN PANEL SIZE (Min)

- A 1219 mm × 1219 mm
- 762 mm × 762 mm
- 1372 mm × 1219 mm

- Traffic Cone
- Traffic Cone (optional taper)
- Portable Sign

Flashing Arrow Sign (FAS)

FAS SUPPORT OR TRAILER

Direction of Travel

Portable Flashing Beacon

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON FREEWAYS AND EXPRESSWAYS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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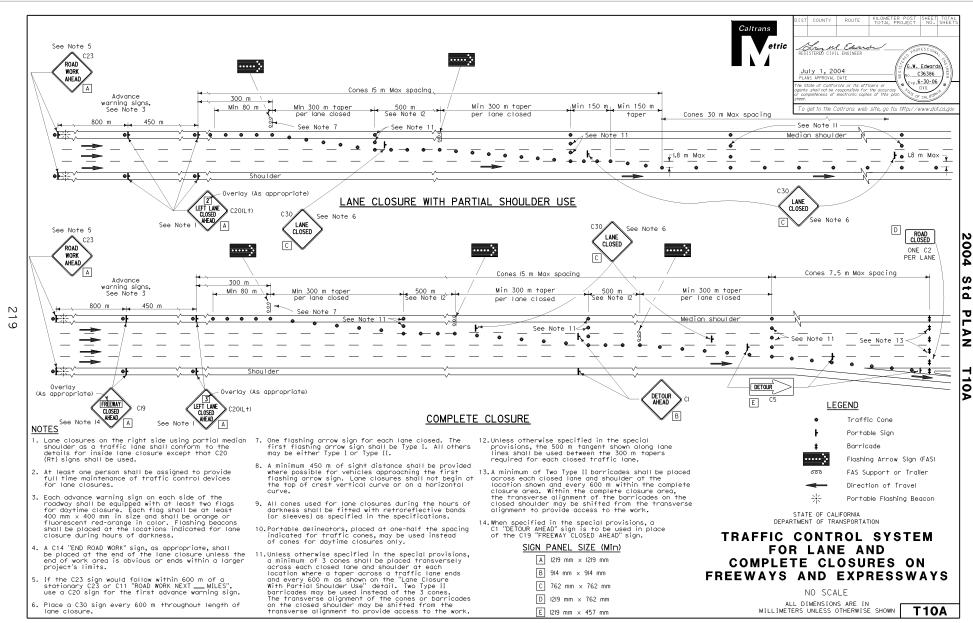
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# Caltrans

COUNTY ROUTE KILOMETER POST SHEET TOTAL TOTAL PROJECT NO. SHEETS

Greg W. Edwards

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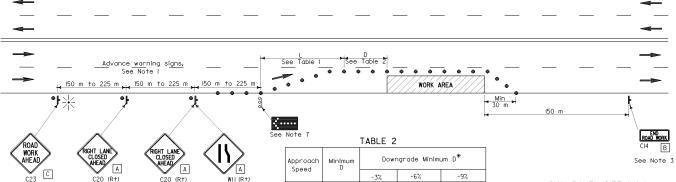
Leg Ul. Edwards

July 1, 2004
PLANS APPROVAL DATE

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#### TYPICAL LANE CLOSURE



-9% km/h m 30 45 45 40 45 50 50 53 50 45 66 74 60 45 87 92 97 70 116 124 80 144

80 85 136 144 154

\* Use on sustained downgrade steeper than or equal to grades shown and longer than 1.6 km.

#### SIGN PANEL SIZE (Min)

- A 914 mm × 914 mm
- B 914 mm × 457 mm
- C 762 mm × 762 mm

#### LEGEND

- Traffic Cone
- Portable Sign
- Direction of Travel

  Flashing Arrow Sign (FAS)
- οσο FAS Support or Trailer
  - Portable Flashing Beacon

#### **NOTES**

 Where approach speeds are low, advance warning signs may be placed at 90 m spacing and placed closer in urban areas.

See Notes 2 and 4

- 2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 400 mm x 400 mm in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
- 3. A CI4 "END ROAD WORK" sign, as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious, or ends within a larger project's limits.
- 4.If the C23 sign would follow within 600 m of a stationary C23 or C11 "ROAD WORK NEXT \_\_\_\_ MILES", use a C20 sign for the first advance warning sign.
- 5. All cones used for lane closures during the hours of darkness shall be fitted with retroreflective bands (or sleeves) as specified in the specifications.

- Portable delineators, placed at one-half the spacing indicated for traffic cones, may be used instead of cones for daytime closures only.
- 7. Flashing arrow sign shall be either Type I or Type II.

See Note 10

- The maximum spacing between cones along a tangent shall be 15 m and along a taper shall be approximately as shown in Table I.
- 9. For approach speeds over 80 km/h, use the "Traffic Control System for Lane Closure On Freeways And Expressways" plan for lane closure detalls and requirements.
- IO.When specified in the special provisions, a WII "LANE ENDS" symbol sign is to be used in place of the C20 "RIGHT LANE CLOSED AHEAD" sign.

#### TABLE I

Approach Speed	* Minimum L	** Max spacing of cones along taper
km/h	m	m
30	38	6
40	38	8
50	98	10
60	98	12
70	183	14
80	183	15
0ver 80	See Note 9	
* Use L for lane widths less		

\* Use L for lane widths less than or equal to 3.6 m.

\* \* See Note 8

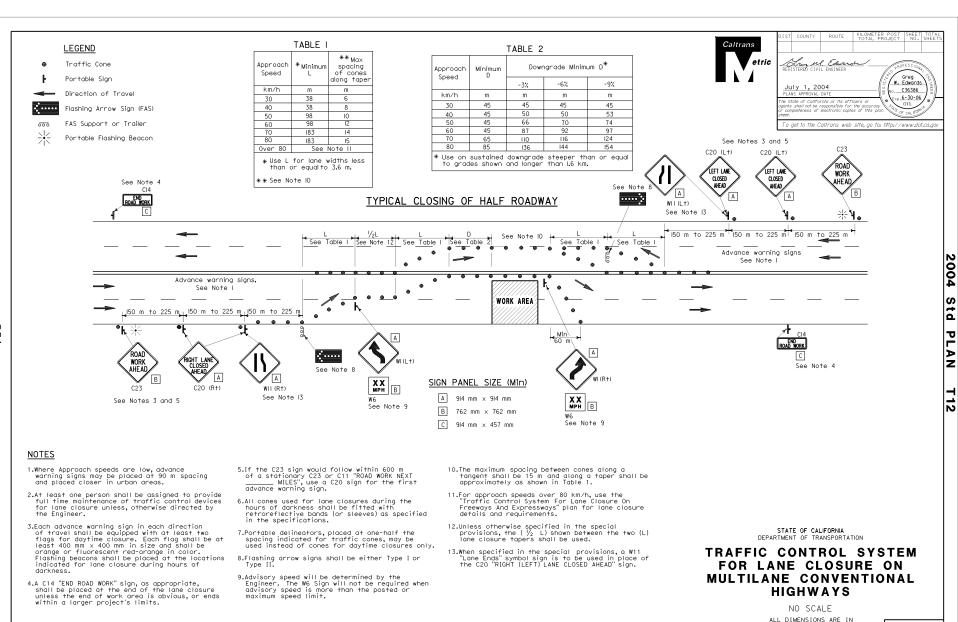
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

#### TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS

NO SCALE

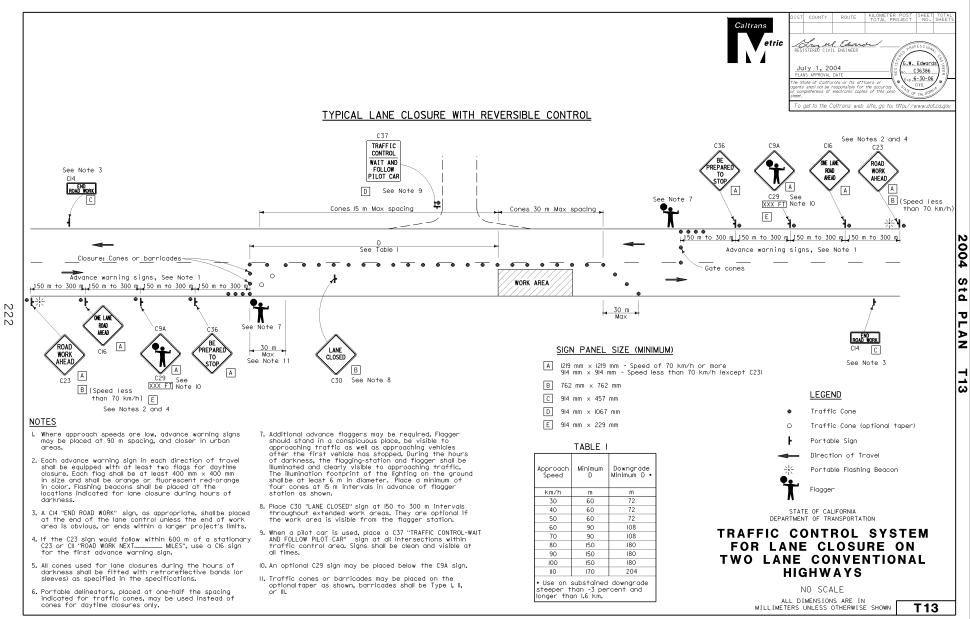
ALL DIMENSIONS ARE IN
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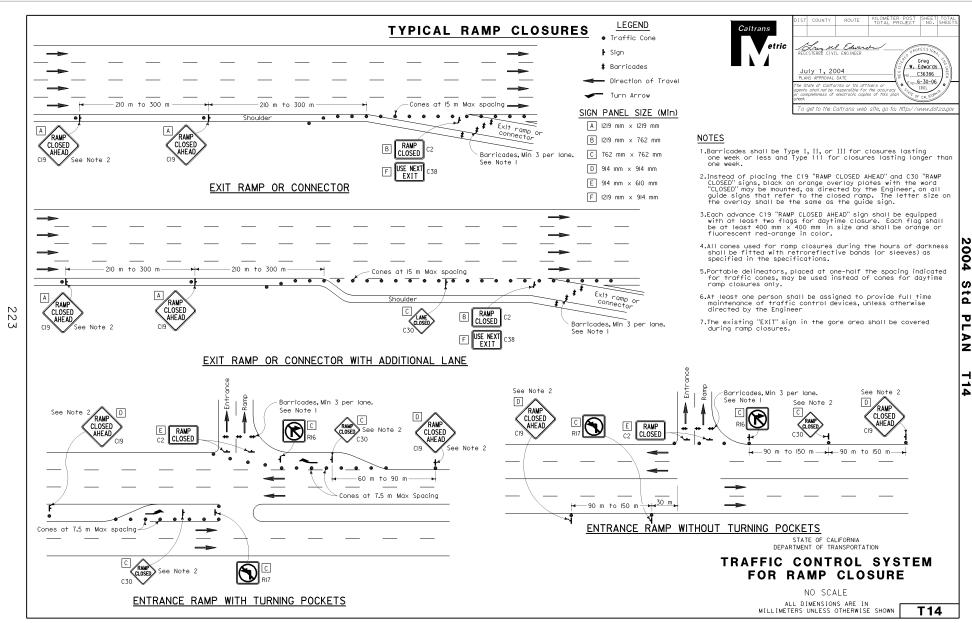


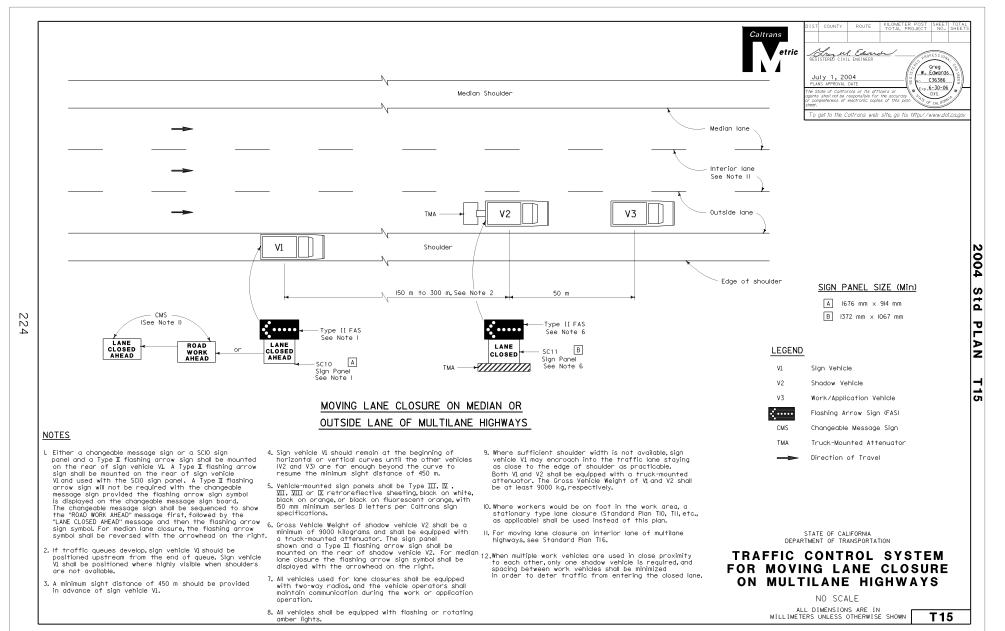


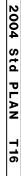
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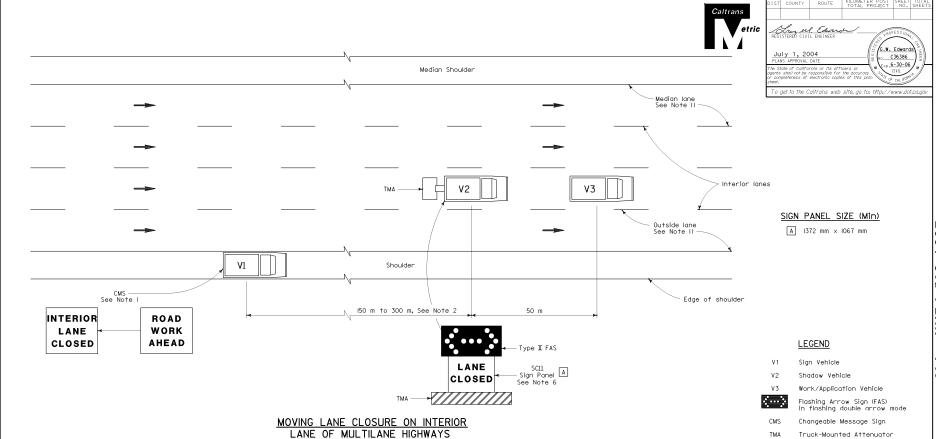
MILLIMETERS UNLESS OTHERWISE SHOWN











#### NOTES

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- I. A changeable message sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "INTERIOR LANE CLOSED" message. The message "CENTER LANE CLOSED" may be used in place of the "INTERIOR LANE CLOSED" message.
- 2. If traffic queues develop, sign vehicle VI should be positioned upstream from the end of queue. Sign vehicle VI shall be positioned where highly visible when shoulders are not available.
- A minimum sight distance of 450 m should be provided in advance of sign vehicle VI.
- 4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 450  $\rm m_{\bullet}$
- 5. Vehicle-mounted sign panels shall be Type III, IX, XIII, VIIII, or IX retroreflective sheeting, black on white, black on orange, or black on fluorescent orange, with 150 mm minimum series D letters per Caltrans sign specifications.
- 6. Gross Vehicle Weight of shadow vehicle V2 shall be a minimum of 9000 kilograms and shall be equipped with a truck-mounted attenuator. The sign panelshown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2.
- 7. All vehicles used for lane closures shall be equipped with two-way radios, and the vehicle operators shall maintain multilane highways, see Standard Plan TI5. two-way radios, and the vehicle operators shall maintain communication during the work or application operation.
- 8. All vehicles shall be equipped with flashing or rotating amber lights.
- 9. Where sufficient shoulder width is not available, sign vehicle VI may encroach into the traffic lane staying as close to the edge of shoulder as practicable. Both VI and V2 shall be equipped with a truck-mounted attenuator. The Gross Vehicle Weight of VI and V2 shall be at least 9000 kg, respectively.
- 10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan TIO, TII, etc., as applicable) shall be used instead of this plan.
- 12. When multiple work vehicles are used in close proximity to each other, only one shadow vehicle is required, and spacing between work vehicles shall be minimized in order to deter traffic from entering the closed lane.

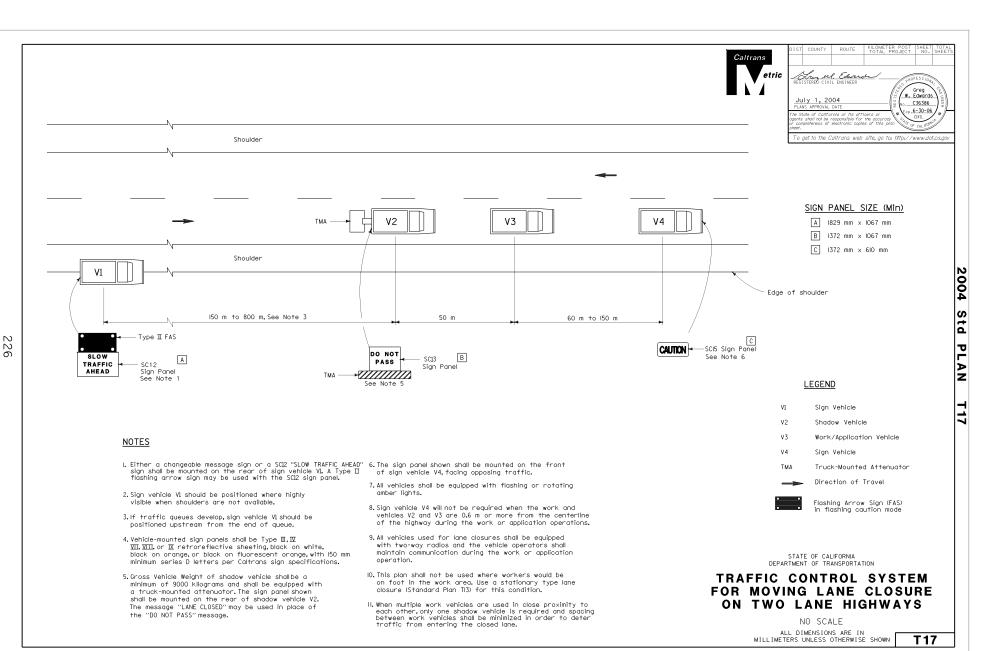
STATE OF CALIFORNIA
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Direction of Travel

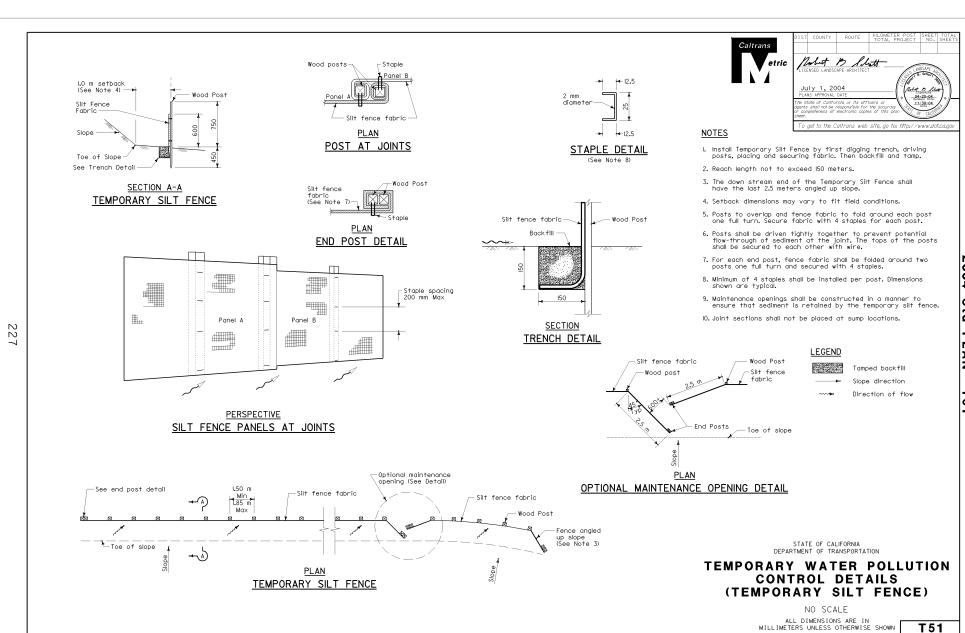
#### TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON MULTILANE HIGHWAYS

NO SCALE

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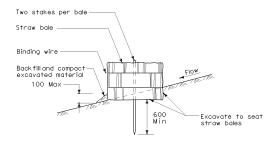




04-20-04 Renewal Date 11-30-04

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Temporary sllt fence and temporary fence (Type ESA) shown for reference purposes only.



FRONT ELVATION

600 mm Max

-Back edge of seating excavation

-Temporary Fence (Type ESA)

Angle stake toward— previously placed bale

Wedge loose straw-between bales

Straw bales-

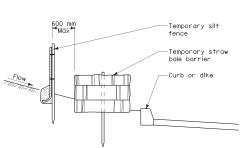
Temporary straw bale barrier

Temporary

silt fence

228

#### TEMPORARY STRAW BALE BARRIER



**SECTION** PLACEMENT DETAIL FOR TEMPORARY SILT FENCE AND TEMPORARY FENCE (TYPE ESA) USED WITH TEMPORARY STRAW BALE BARRIER (See Note I)

Construction

Activities

600 mm Max

**SECTION** PLACEMENT DETAIL FOR TEMPORARY SILT FENCE USED WITH TEMPORARY STRAW BALE BARRIER (See Note I)

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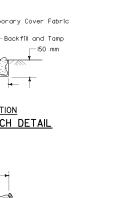
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY STRAW BALE BARRIER)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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**SECTION** 





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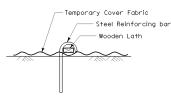


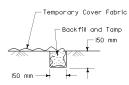
Overlap sheets

## STEEL REINFORCING BAR DETAIL

**₩** 100

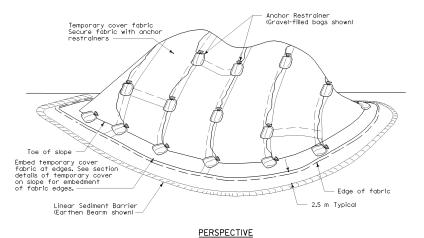
⊶13 Reinforcing Bar





**SECTION** ANCHOR RESTRAINER (Steel bar and wooden lath)

**SECTION** KEY TRENCH DETAIL



TEMPORARY COVER ON STOCKPILE

PERSPECTIVE TEMPORARY COVER ON SLOPE

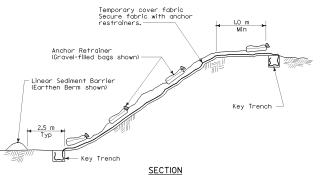
Top of slope

Temporary cover fabric Secure fabric with anchor restrainers

Toe of slope

Linear Sediment Barrier (Earthen Berm shown) -

22



TEMPORARY COVER ON SLOPE

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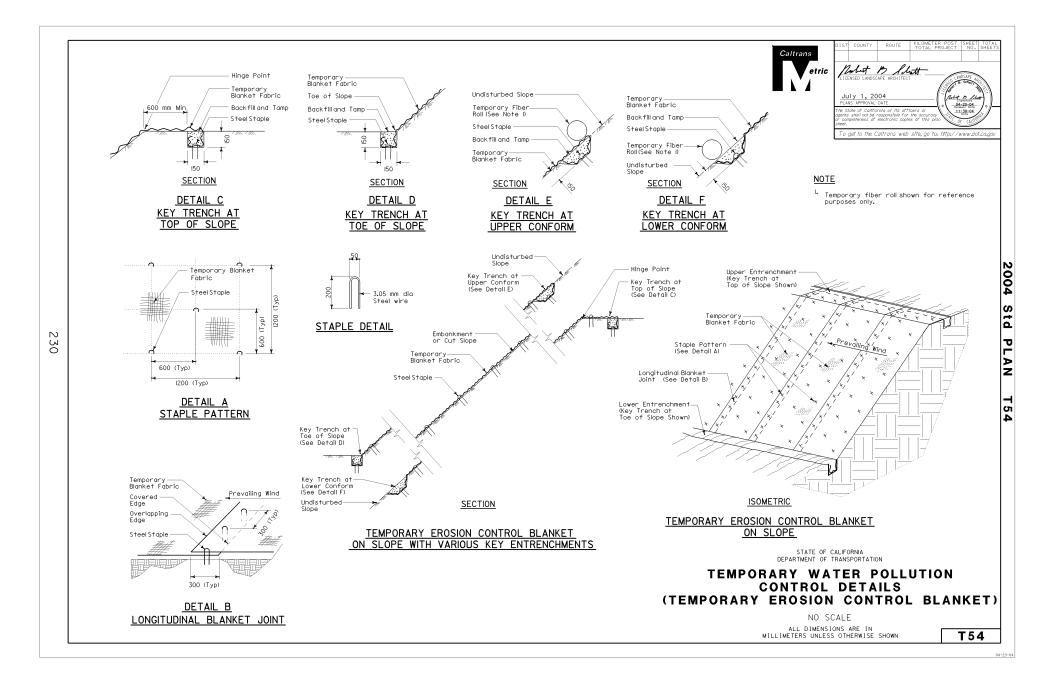
#### **TEMPORARY WATER POLLUTION CONTROL DETAILS** (TEMPORARY COVER)

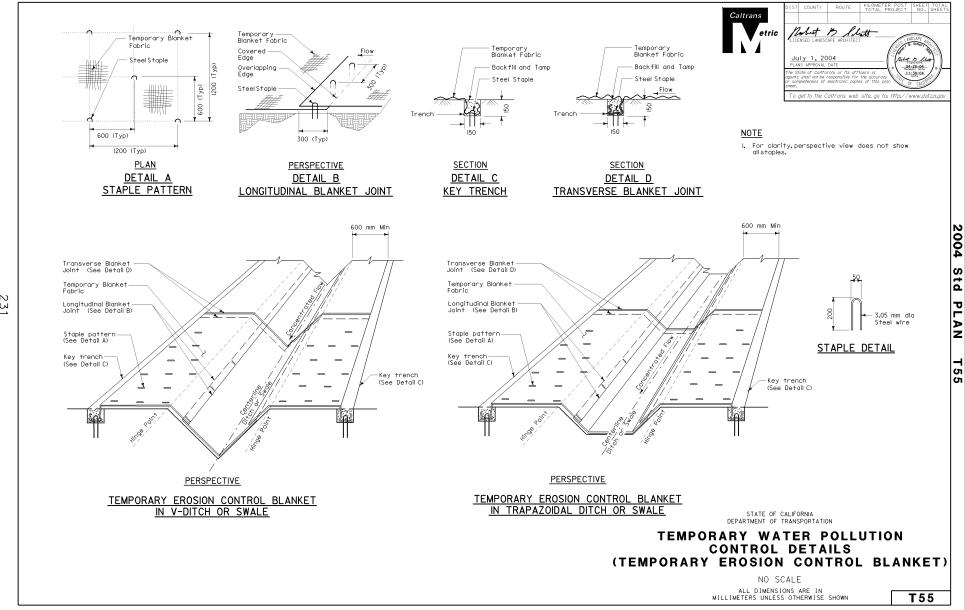
NO SCALE

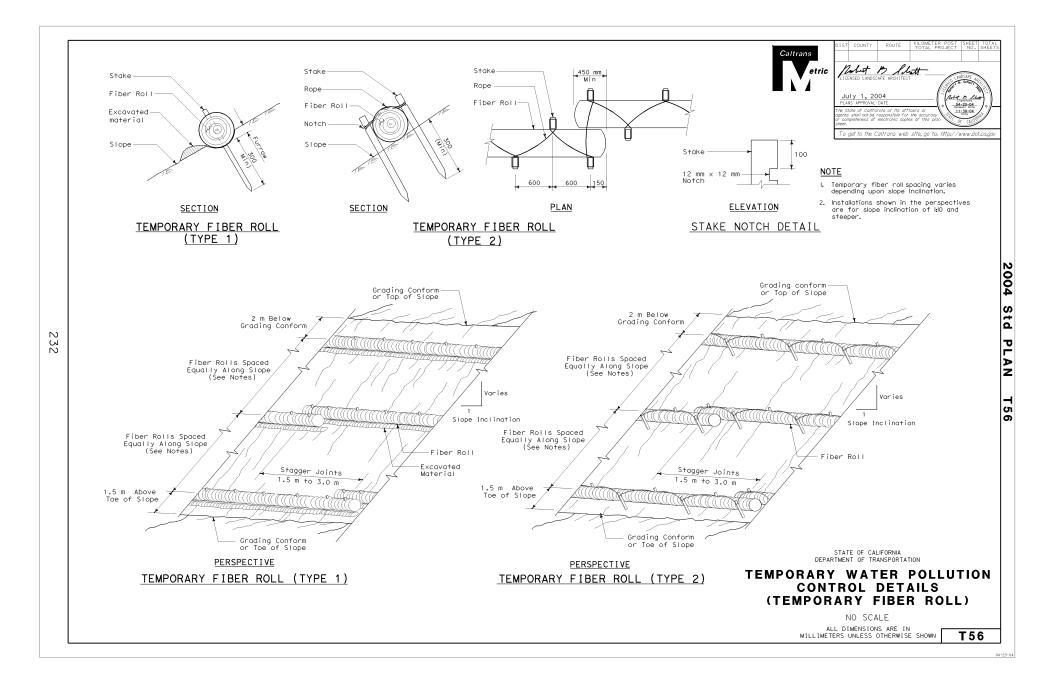
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

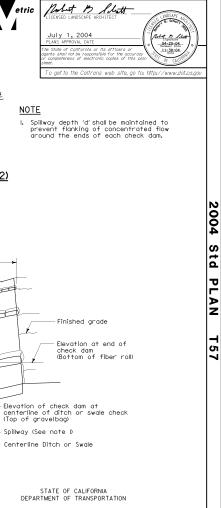
T53

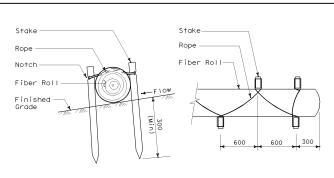
2004 Std PLAN











Stake  $\begin{array}{c} \text{12 mm} \times \text{12 mm} \\ \text{Notch} \end{array}$ ELEVATION

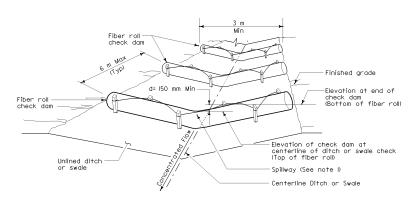
STAKE NOTCH DETAIL

Gravel bags Finished Grade

Caltrans

SECTION PLAN STAKING AND LASHING DETAIL

SECTION TEMPORARY CHECK DAM (TYPE 2)



#### **PERSPECTIVE** TEMPORARY CHECK DAM (TYPE I) (Total of 3 check dams shown)

Gravel baa check dam d = 150 mm Min-Gravel bag check dam -Elevation of check dam at centerline of ditch or swale check (Top of gravelbag) Ditch or Swale —— (Lined ditch shown) - Spîllway (See note 1)

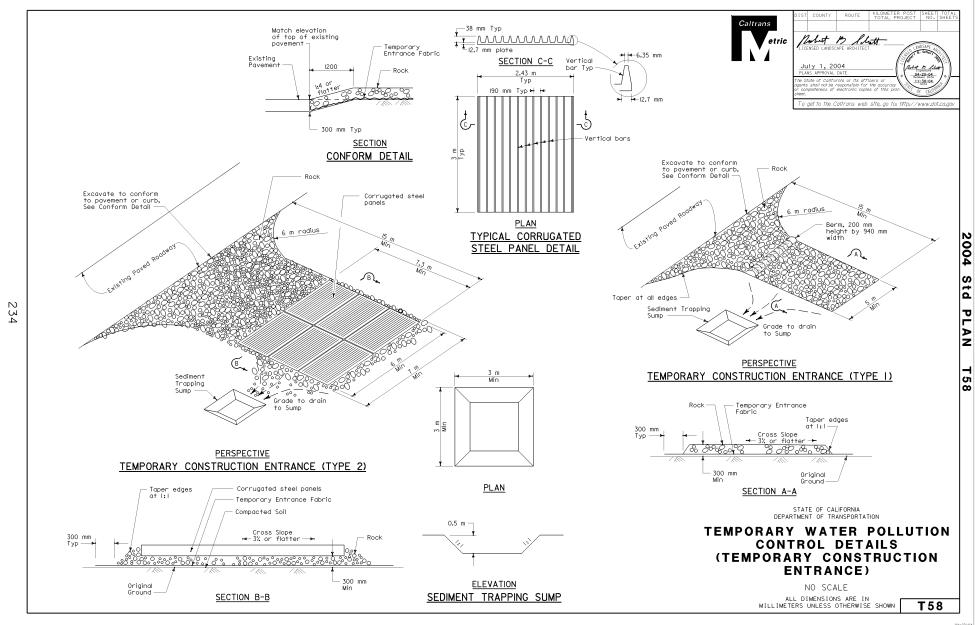
### **PERSPECTIVE** TEMPORARY CHECK DAM (TYPE 2)

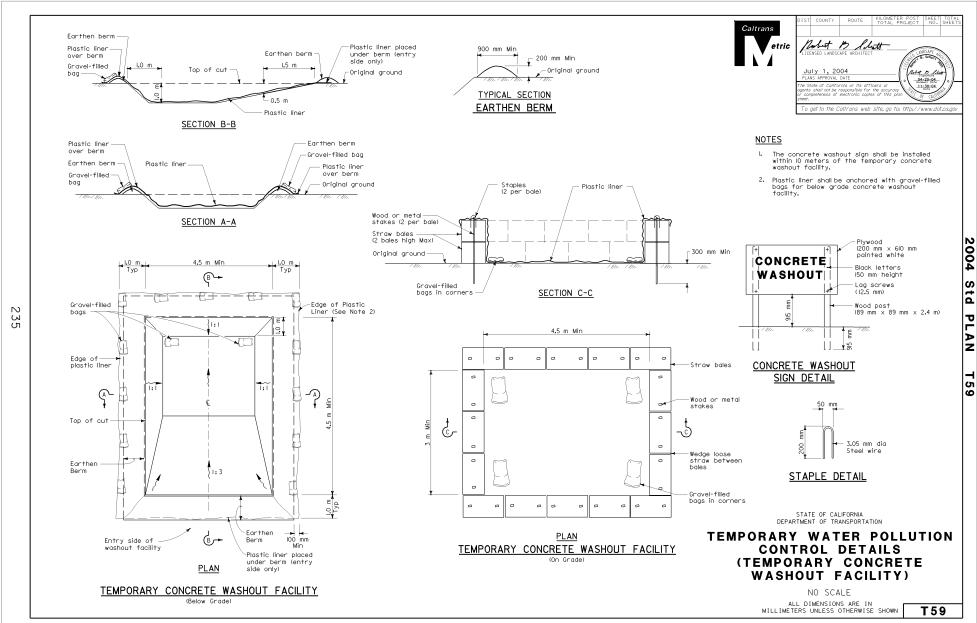
(Total of 3 check dams shown)

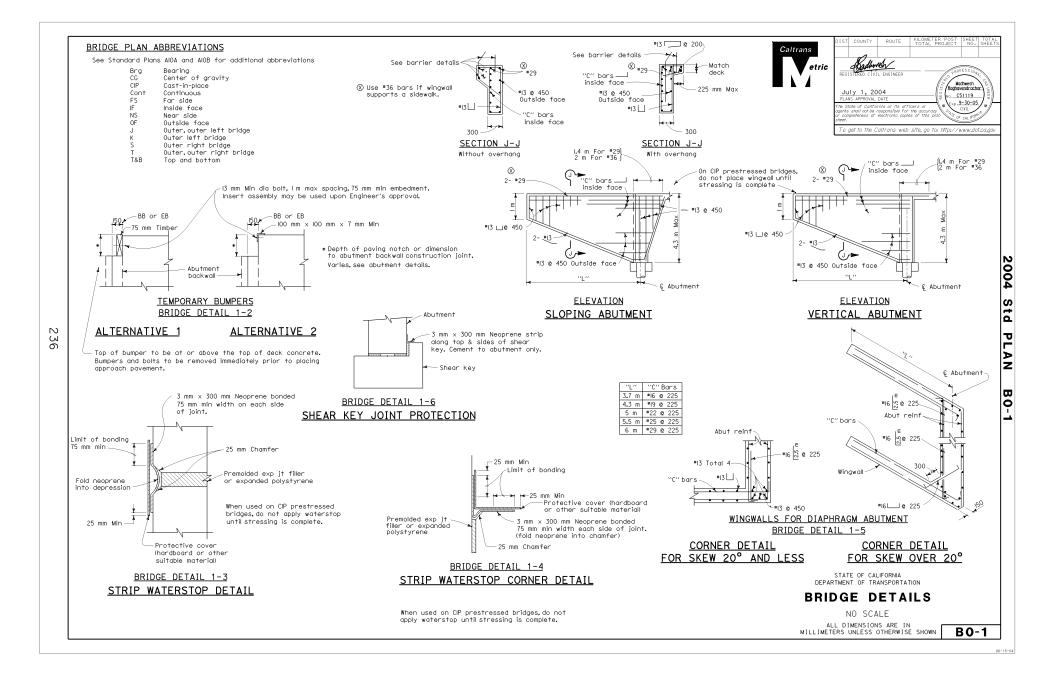
#### **TEMPORARY WATER POLLUTION CONTROL DETAILS** (TEMPORARY CHECK DAM)

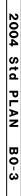
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN













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BRIDGE DETAIL 3-6 WATERSTOP

60 mm Min

13 mm Min

ල|3 mm±–\$

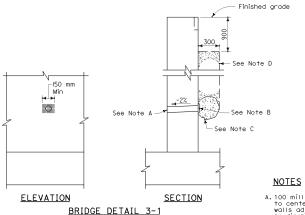
Bonding strip



### **NOTES**

Holes will be permitted in the outer 13 millimeters of the web for wire, rings, etc. Tie web to #10 reinforcing bars @ 400 millimeters maximum intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.

Waterstop to have 5 or more pairs of of raised ribs to provide 65 square millimeters minimum rib cross-section area on each half of the waterstop.



WEEP HOLE AND PERVIOUS BACKFILL

BRIDGE DETAIL 3-5

200 mm PSP AND PERMEABLE MATERIAL

Grading plane

200 mm PSP (1.63 mm thickness) and permeable material continuous

150 -

behind abutment

W

Top of wall 29 200 mm Max Bridge Detail 3-4 Bridge Detail 3-I Bridge Detail 3-2 Bridge Detail 3-4 300 mm Min 17300 mm Max └Top of footing

Front face of wall

BRIDGE DETAIL 3-4

WALL EXPANSION JOINT

13 mm Premolded expansion joint filler unless other thickness and/or material

is shown elsewhere.

\* For placement in bridge decks see Joint Seal Details. For wall

the wall thickness.

thickness less than 300 mm, use  $\frac{1}{2}$ 

BRIDGE DETAIL 3-3 WALL EXPANSION JOINTS AND WEAKENED PLANES

Cut or butt every other front face horizontal bar SECTION

Joint may be formed with 3 mm hardboard and cut back to the root of the chamfer

-19 mm Chamfer

DETAIL A BRIDGE DETAIL 3-2 WEAKENED PLANES

- A.100 millimeter Ø Drains @ 7600 millimeters maximum center to center (2750 millimeters center to center for Type 3 and 2800 millimeters center to center for Type 4 retaining walls). For walls adjacent to sidewalks or curbs, provide 100 millimeters plastic pipe ander the sidewalk to discharge thru curb face. Exposed wall drains shall be located 75 millimeters ± above finished grade.
- B. 150 millimeters square aluminum or galvanized steel wire 6 millimeters mesh hardware cloth (minimum wire diameter 0.64 millimeters). Anchor firmly to backface.
- C. 0.03 cubic meter pervious backfill material in a nonwoven filter fabric, securely tied.
- D. Pervious backfill material continuous behind retaining wall or abutment.

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### **BRIDGE DETAILS**

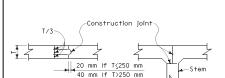
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

B0-3







BRIDGE DETAIL 5-2 Top or bottom slab

AT SIDEWALK

 $^{\circ}$ 

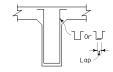
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BRIDGE DETAIL 5-3

U or U REINFORCED BOX GIRDER Girder or diaphragm

AT CONCRETE

BARRIER TYPE 25



T-BEAM Girder, bent cap or diaphragm A reinforcement bar must be placed inside of each stirrup hook or 90° bend.

BRIDGE DETAIL 5-5

ALTERNATIVE STIRRUPS



PRECAST GIRDER

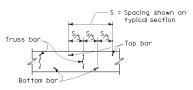
Stirrup Size	(mm)
#13	125
#16	150
#19	200
#22	225
#25	250

DECK CONSTRUCTION JOINTS

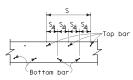
Place reinforcement to provideapproximately equal spaces

Continuous reinforcement required at bends in stirrup and deck reinforcement and edge of deck and adjacent to rail dowels.

BRIDGE DETAIL 5-I5 TOP GIRDER REINFORCEMENT



# BRIDGE DETAIL 5-10



BRIDGE DETAIL 5-11 TRANSVERSE DECK REINFORCEMENT SPACING DIAGRAMS

The Contractor shall submit a deck placing schedule which will be subject to the approval of the Engineer. Unless shown otherwise on the plans, the following conditions shall be provided for:

- Transverse joints will not be permitted in simple spans unless approved by the Engineer. For continuous spans, transverse joints may be located at about the 1/4 point of span. If the deck is placed over continuous steel or precast concrete girders, the portion over the supports shall be placed last.
- 2. Longitudinal joints shall be located at the edge of a traffic lane unless otherwise permitted by the Engineer.
- 3. For decks supported on precast concrete girders, the intermediate and end diaphragms shall be placed at least five days before the deck.
- 4. For deck supported on structural steel, the crossframes for the entire width of bridge shall be in place.
- 5. Reinforcing steel shall be continuous thru all construction

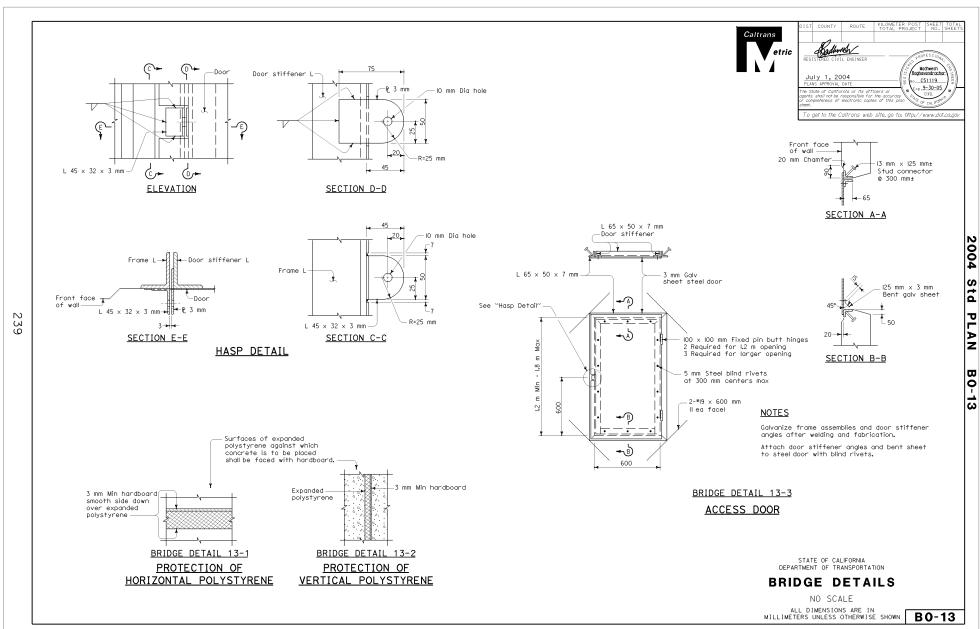
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### **BRIDGE DETAILS**

NO SCALE

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BO-5







NOTES

Reinforcement extending into footing shall be hooked as required to provide clearance to top of footing.

Lapped splices in spiral pile reinforcement shall be lapped at least 80 wire/bar diameters. Spiral pile reinforcement at splices and at ends shall be terminated with a 135° hook with a 150 mm tail hooked around a longitudinal bar.

Piles shall be extended only in accordance with details shown in the Project Plans.

### **DESIGN NOTES**

REINFORCED CONCRETE fy = 420 MPa flc = 28 MPa

### DESIGN CAPACITY

400 & 625 KILONEWTON PILE

### COMPRESSION:

625 kN (Service state) 1250 kN (Nominal axial strength)

### TENSION:

250 kN (Service state) 625 kN (Nominal axial strength)

### 900 KILONEWTON PILE

900 kN (Service state) 1800 kN (Nominal axial strength)

### TENSION:

360 kN (Service state) 900 kN (Nominal axial strength)

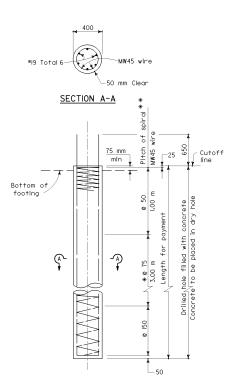
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

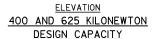
## 400 mm AND 600 mm CAST-IN-DRILLED-HOLE **CONCRETE PILE**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

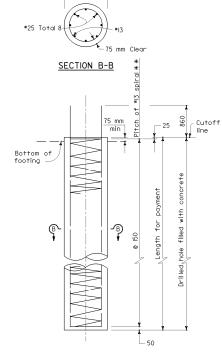
**B2-3** 



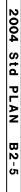


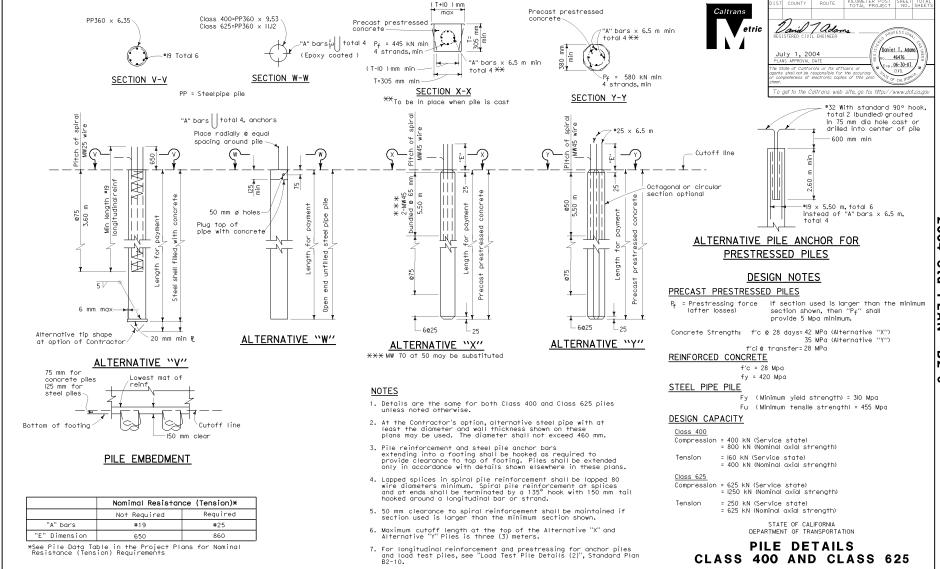
40

- \* @ 50 at option of contractor
- \*\* Extend at 50 mm pitch to top of anchor piles and load test piles. For longitudinal reinforcement for anchor piles and load test piles, see "Load Test Pile Details (2)", Standard Plan B2-10.



**ELEVATION** 900 KILONEWTON DESIGN CAPACITY

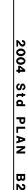




8. Alternative "W" piles shall not be used for corrosive environments.

B2-5

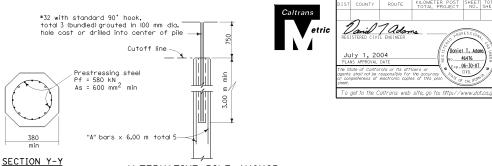
NO SCALE ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



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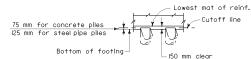
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ALTERNATIVE PILE ANCHOR FOR PRESTRESSED PILE

	Nomimal Resistance (Tension)*		
	Not Required	Required	
"A" bars	#19	#25	
"E" Dimension	650	860	

\*See Pile Data Table in the Project Plans for Nominal Resistance (Tension) Requirements



### **DESIGN NOTES**

### **DESIGN CAPACITY:**

Compression = 900 kN (Service state)

= 1800 kN (Nominal axial strenath)

Tension = 360 kN (Service state) = 900 kN (Nominal axial strength)

### REINFORCED CONCRETE

f'c = 28 MPa fy = 420 MPa

### PRECAST PRESTRESSED PILES

Pf = Prestress Force (After losses) Concrete Strength f' @ 28 days = 48 MPa f<sub>Cl</sub> @ transfer = 28 MPa

### STEEL PIPE PILE

Fy (minimum yield strength) = 310 MPa Fu (minimum tensile strength) = 455 MPa

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PILE EMBEDMENT

## PILE DETAILS CLASS 900

NO SCALE

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**B2-8** 

4. Alternative "W" piles shall not be used for corrosive environments. 5. Maximum cut-off length at the top of the Alternative "X" and Alternative ''Y'' piles is three (3) meters.

3. At the Contractor's option, alternative steel pipe with at least the diameter and wall thickness shown on these plans may be used. The diameter shall not exceed 460 mm.

Pile reinforcement extending into footing shall be hooked as required to provide clearance to top of footing.

2. Lapped splices in spiral pile reinforcement shall be lapped

Solving a diameters minimum. Spiral pile reinforcement statil be lapped as wire diameters minimum. Spiral pile reinforcement at spiles and at ends shall be terminated by a 135° hook with 150 mm tall hooked around a longitudinal bar or strand

-PP 406 x I2.70

"A" bars 🗐 | Total 6

-50 mm ø holes equally spaced around

Cutoff line.

"A" bars x 7.00 m

"A" bars  $\times$  7.00 m total 5 to be in place

when pile is cast

Total 5 typical

(Epoxy coated)

pile - total 6

."A" bars Total 6

place radially

12

£

SECTION W-W

PP = Steel pipe pile

g).

ALTERNATIVE "W"

Plug pile with concrete (125 mm min depth)

125 mm min-

50 mm ø holes

V)

365 mm max

345 mm

355

SECTION X-X

25 mm chamfer

Prestressing steel Pf = 605 kN

"A" bars x 7.00 m total 5 to be in place when

Octagonal or circular

section optional-

pile is cast-

tch of spir MW55 wire

25

-25

\*\* MW70 @ 45 may be substituted

ALTERNATIVE "Y"

As = 600 mm<sup>2</sup> min

ĘĪ

65

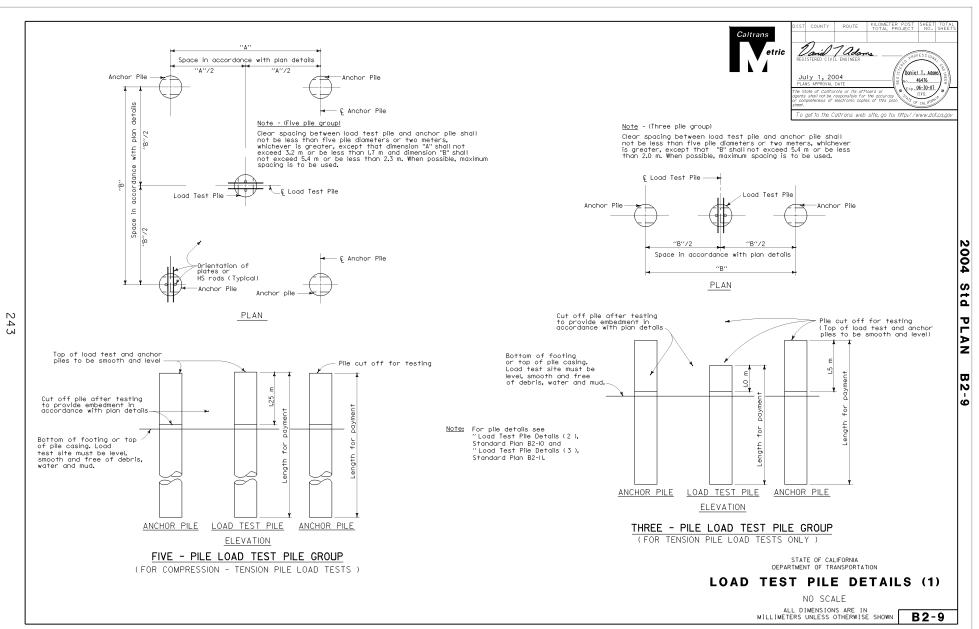
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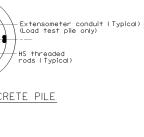
- 25

\* \* MW70 @ 45 may be substituted

**NOTES** 

ALTERNATIVE "X"





ROUTE KILOMETER POST TOTAL PROJECT

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/Daniel T. Adam

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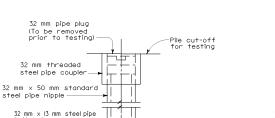
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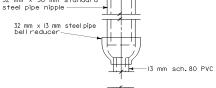
PLAN

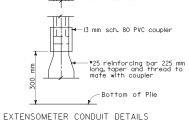
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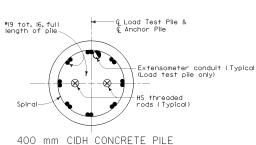
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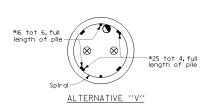


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July 1, 2004

he State of California or its officers or

Caltrans



Pile cutoff

Coupler

Spiral

Longit.

4 4 for testing

hex nuts.

**⊕**►

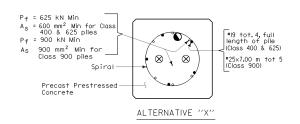
ELEVATION

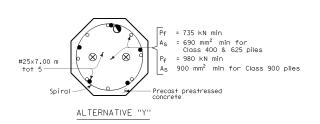
Extensometer conduit

2 - 35 mm HS threaded steel rods passing through 40 mm ø holes in "D" ø x 50 mm HS steel plate and anchored with

See table below for "D".

(Load test pile only)





# CONCRETE PILE DETAILS

PILE TYPE		MAXIMUM TENSILE TEST FORCE PER PILE
Class 400 & 625 Alt "V","Y"	175	935 kilonewtons
Class 400 & 625 Alt "X"	150	935 kilonewtons
Class 900 Alt "X","Y"	170	l350 kilonewtons
CIDH	200	1350 kilonewtons

( Load test pile

and ( anchor pile -

75 mm →

**⊣**—150 mm

50,

SECTION D-D

\*38 mm for Alt "X"

Ŷ

### NOTES:

- For details not shown see applicable pile details shown elsewhere in the Project Plans.
- 2. For the additional top 1.25 meters of pile for testing, the spiral reinforcment shall be the same size and placed at the same pitch as detailed for the top of piles shown elsewhere in the Project Plans.
- 3. Details applicable for load test and anchor piles.

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### LOAD TEST PILE DETAILS (2)

NO SCALE

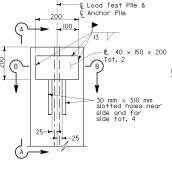
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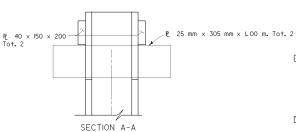
B2-10

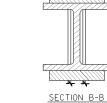
Daniel T. Adams 46476 p 06-30-07 CIVIL

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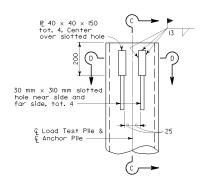




Maximum Tensile Test Force Per Pile : HP 250x62= 800 kN HP 250x85= 1090 kN HP 360x132= 1350 kN

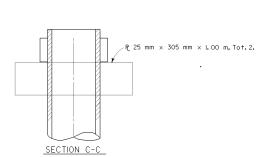
# STEEL H-PILE DETAILS

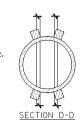
<u>Note</u> Alignment of slots and 40 mm  $\mathbb{R}$  's shall permit a  $\mathbb{R}$  25 mm  $\times$  305 mm  $\times$  1.00 m to pass through pile parallel to  $\mathbb{Q}$  web of pile and achieve a snug fit. Details applicable for load test and anchor piles. Slots to be cut after piles are driven.



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Maximum Tensile Test Force Per Pile : Class 400 (PP 360 X 9.53)= 800 kN Class 625 (PP 360 X 1.1/2)= 1245 kN Class 900 (PP 406 X 12.70)= 1350 kN

# ALTERNATIVE "W" STEEL PIPE - PILE DETAILS

Alignment of slots and 40 mm  $\Re$  's shall permit a  $\Re$  25 mm  $\times$  305 mm  $\times$  1.00 m to pass through pile. Details applicable for load test and anchor piles. Slots to be cut after piles are driven.

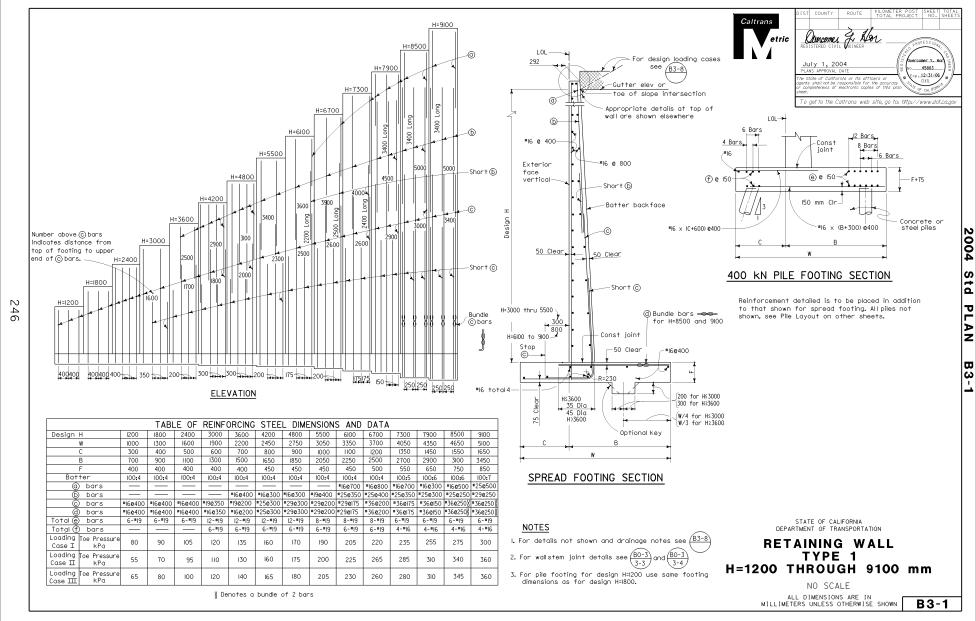
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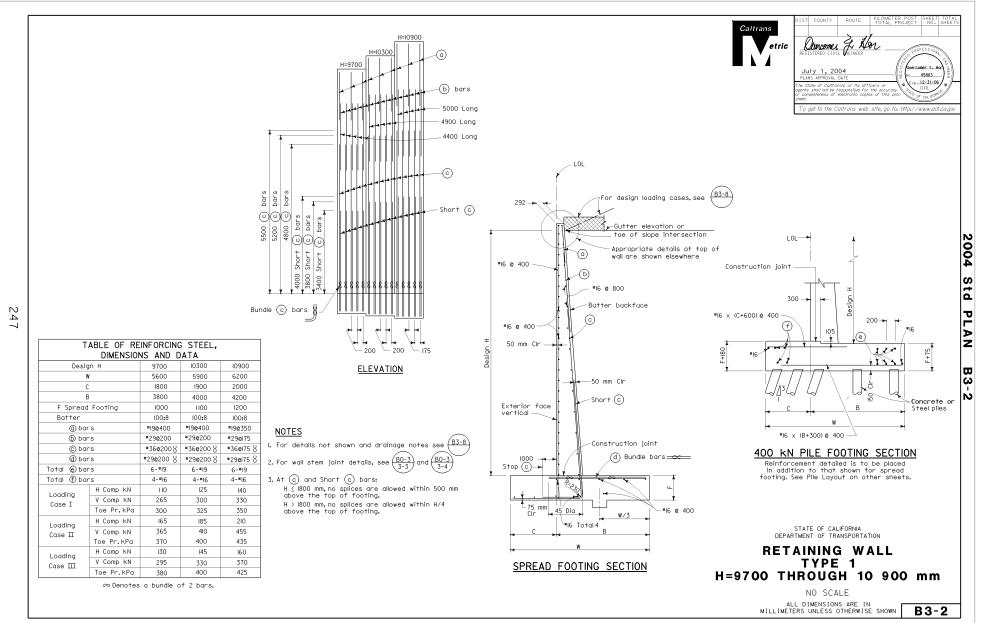
### LOAD TEST PILE DETAILS (3)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

B2-11











LOL-Gutter elev or #I6 @ 400-0 Vertical #16 @ 800 50 mm Clear--50 mm Clear Short © 400 → Construction joint Stop © \_50 mm Clr H=2400 to **→**|**→**-50 75 mm Cir--#16 Total 8 Optional key

Case I Level + II.5 kPa surcharge -Case Ⅱ 150 -I:2 Unlimited Slope Gutter elev or toe of slope intersection 300 mm Min -150-Place waterstop as shown when required Finished arade **—** 300 450 mm Min-Backfill sufficiently to prevent ponding. To be done after removal of wall forms and before backfilling behind walls.

**DESIGN** 

Construction joint

6 Bars

6 Bars

7

150 mm Cir

Concrete or steel piles

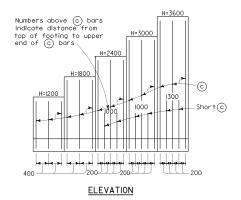
# 400 kN PILE FOOTING SECTION

Reinforcement detailed is to be placed in addition to that shown for spread footing. All piles not shown, see Pile Layout on other sheets. For pile footing for Design H=1200 use same footing dimensions as for Design H=1800.

### SPREAD FOOTING SECTION

Place concrete in toe, against undisturbed material, except as permitted by the Engineer.

TABLE OF REINFORCING STEEL,					
DIMENSIONS AND DATA					
Design H	1200	1800	2400	3000	3600
W	1000	1300	1600	1900	2200
С	300	400	500	600	700
В	700	900	1100	1300	1500
© bars	#16@400	#16@400	#16@200	*I9@200	#25@200
(d) bars	#16@400	#I6@400	#16@400	*I6@200	#19@200
Total (e) bars	6-#19	6-#19	6-#19	6-#25	6-#25
Total (f) bars	_	_	_	6-#19	6-#19
Case I-Toe Press.kPa	75	95	110	125	135
Case ∐-Toe Press.kPa	50	70	90	110	130



### NOTES

- I. Retaining Wall Type IA designed for Design Loading Cases I and  ${\rm I\hspace{-.1em}I}$  only.
- 2. For design notes, drainage notes and other details, See
- 3. For wall stem joint details, see  $\frac{80-3}{3-3}$  and  $\frac{80-3}{3-4}$
- 4. At © and Short © bars:

  H ≤ 1800 mm, no splices are allowed within 500 mm above the top of footing.

  H > 1800 mm, no splices are allowed within H/4 above the top of footing.

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# RETAINING WALL TYPE 1A

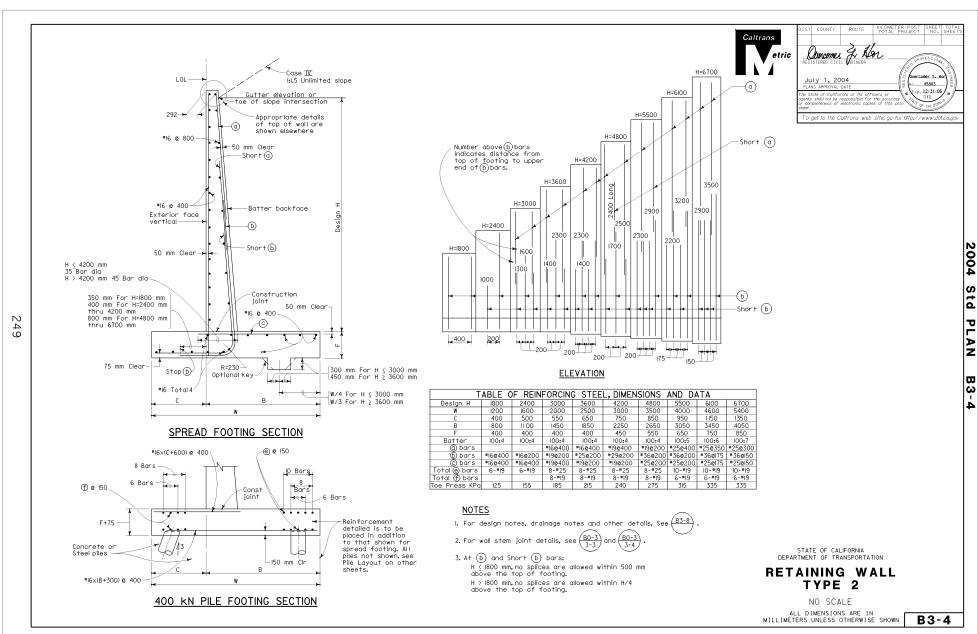
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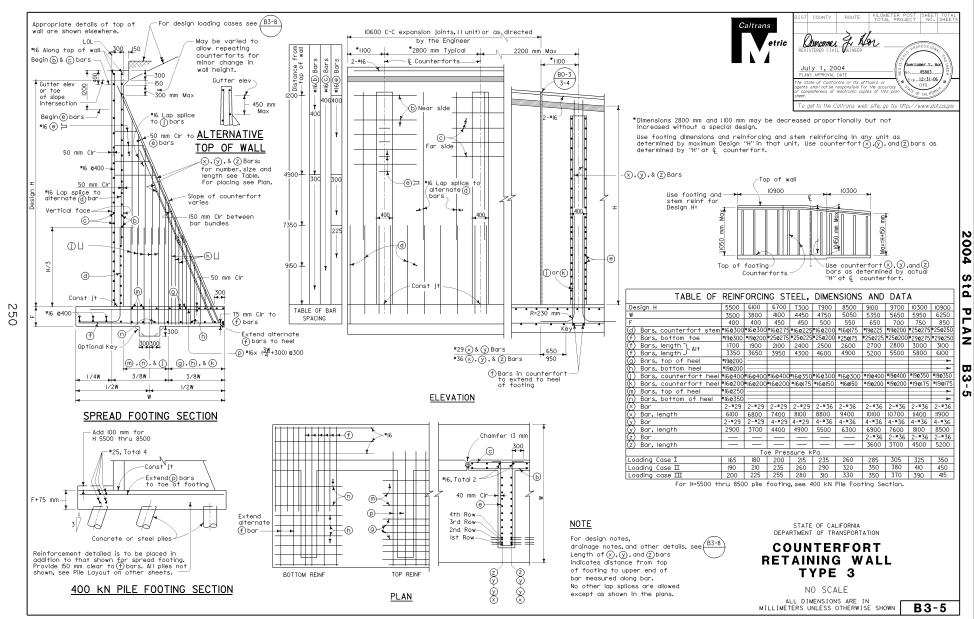
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

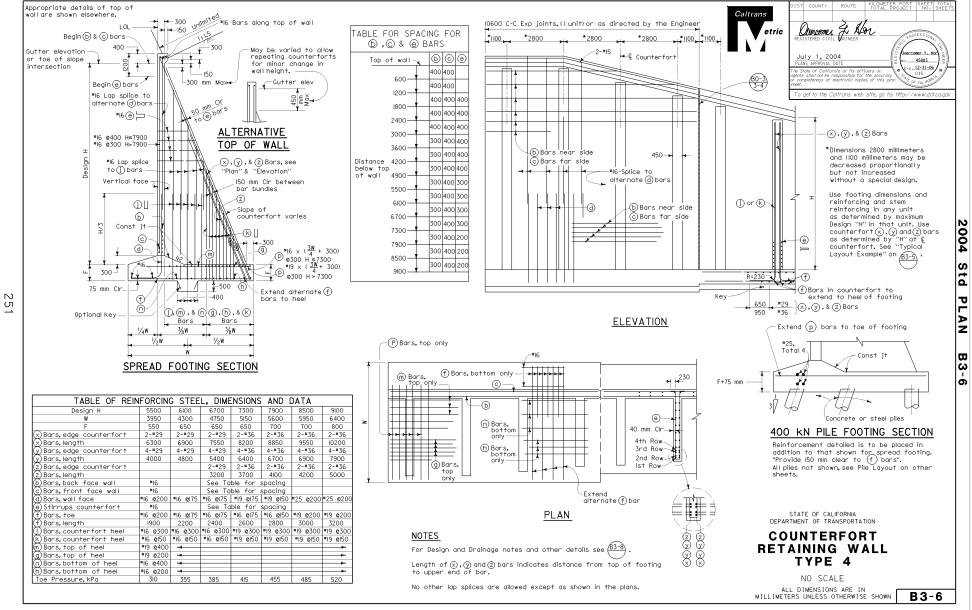
B3-3

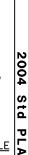
2004 Std PLAN

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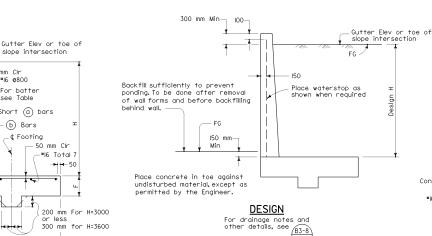




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# SPREAD FOOTING SECTION

-L0L

50 mm Clr

#16 @800

For batter

(b) Bars

\_ & Footing

Short (a) bars

see Table

292

50 mm Clr -

(a) Bars

#I6 @400 ~

Const Jt

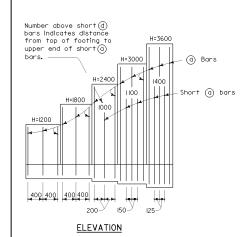
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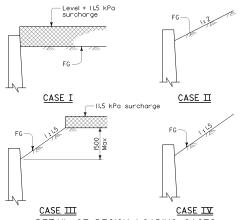
75 mm Clr

Ű

At (a) and Short (a) bars: H ≤ 1800 mm, no splices are allowed within 500 mm above the top of footing.

 $\rm H$  > 1800 mm, no splices are allowed within H/4 above the top of footing.





## DETAIL OF DESIGN LOADING CASES Case I Level +II.5 kPa surcharge

Case Ⅲ 1:2 Unlimited slope

Case III I:1.5 Limited slope (1500 max height)

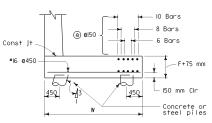
+II.5 kPa surcharge Case Ⅲ I:1.5 Unlimited slope MAX PILE SPACING

FUN 400 KIN FILES						
Design H	Front Row I:3 Batter	Back Row Vertical				
1200	5400	5400				
1800	3600	5400				
2400	2700	5400				
3000	1800	3600				
3600	1200	2400				

For actual spacing, see Wall Layout.

Pile layout does not apply to Case IV conditions.

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Reinforcement detailed is to be placed in addition to that shown for spread footings.

● For Design H=I200 use W=I550 All others from table

### 400 kN PILE FOOTING SECTION

### 1950 r Max= H+I50 mm 📑 1350 Ma 400 --Top of footing Optional footing line

For joints required, see



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Use reinf for H= 1200 1800 2400

July 1, 2004

Top of wall -

Toe of slope -

# TYPICAL LAYOUT EXAMPLE

### NOTES

### Design Conditions:

Design H may be exceeded by I50 mm before going to the next size. Special footing design is required where foundation material is incapable of supporting toe pressure loads listed in table.

### Design Data:

 $f_{C} = 10 \text{ MPa}$   $f'_{C} = 25 \text{ MPa}$   $f_{S} = 168 \text{ MPa}$   $n = 10 \text{ earth} = 19 \text{ kN/m}^{3}$ Case I- Wall design for equivalent fluid pressure = 4.2 and 5.6 kPa/m. Case  $\mathbb{H}$ ,  $\mathbb{H}$  - Wall design is based on Rankine's formula with  $\emptyset$  = 33°42′.

TABLE OF REINFO	ORCING	STEEL,	DIMENS	IONS AND	DATA
Design H		1800	2400	3000	3600
W	1250	1550	2000	2450	2900
F Spread Ftg	400	400	450	450	550
Batter	None	None	None	100:3	100:6
(a) Bars	#16@400	#16@400	#16@400	#16@300	#16@250
Short (a) Bars	None	None	#16@400	#I6@300	#I6@250
(b) Bars	#16@400	#16@400	#16@200	#16@150	#16@125
Total (e) Bars	8-#19	8-#19	10-#19	8-#19	6-#19
○ Case I kPa	80	105	120	145	170
®  Case Ⅲ kPa	75	100	130	165	195
⊢ ∰ Case Ⅲ kPa	80	110	140	185	210
र्ट Case IV kPa	95	155	200	255	310

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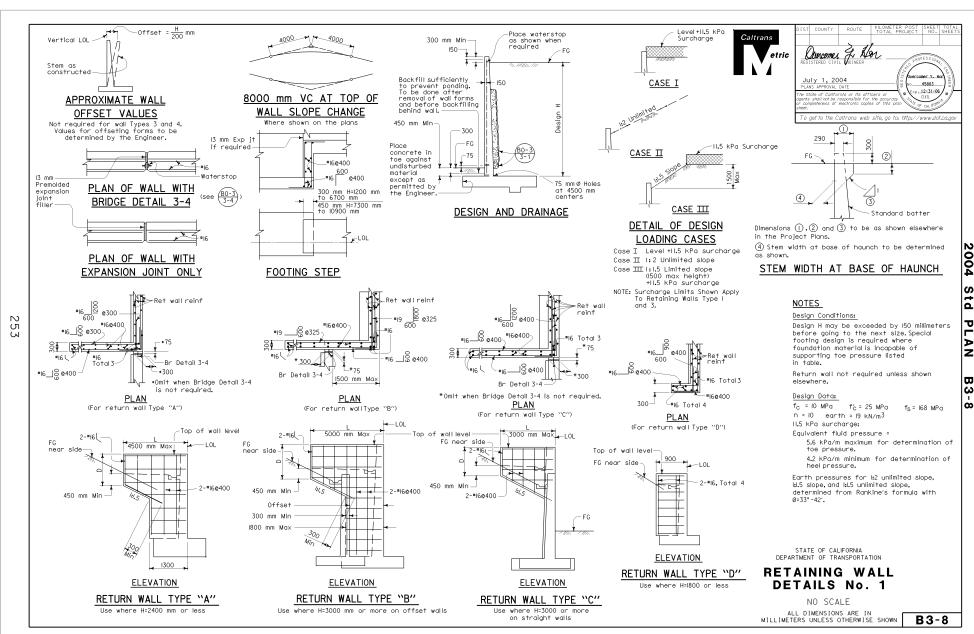
# RETAINING WALL TYPE 5

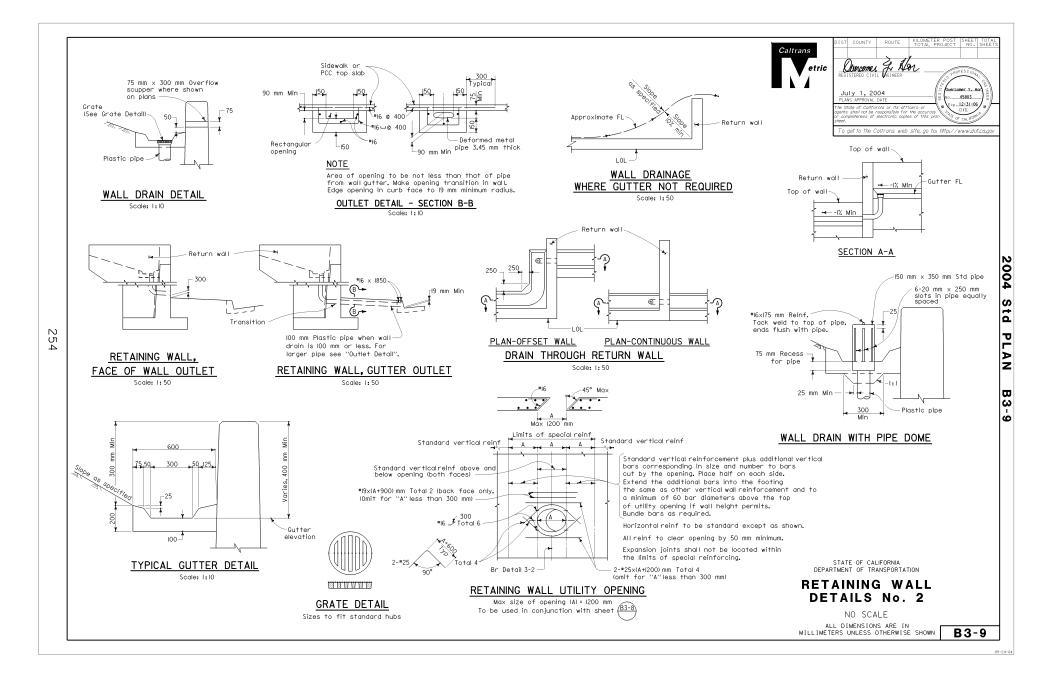
NO SCALE

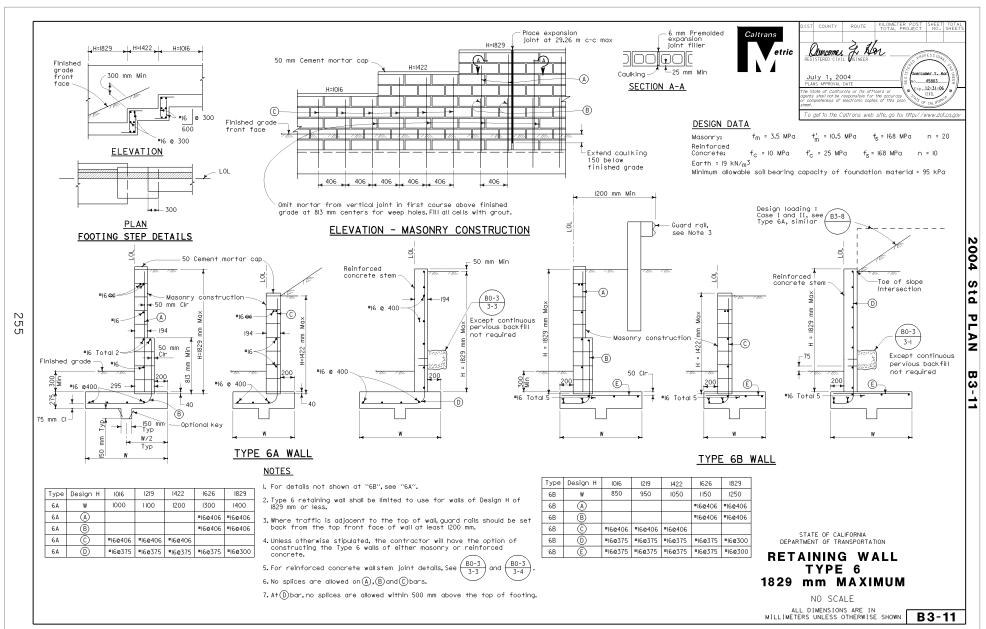
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

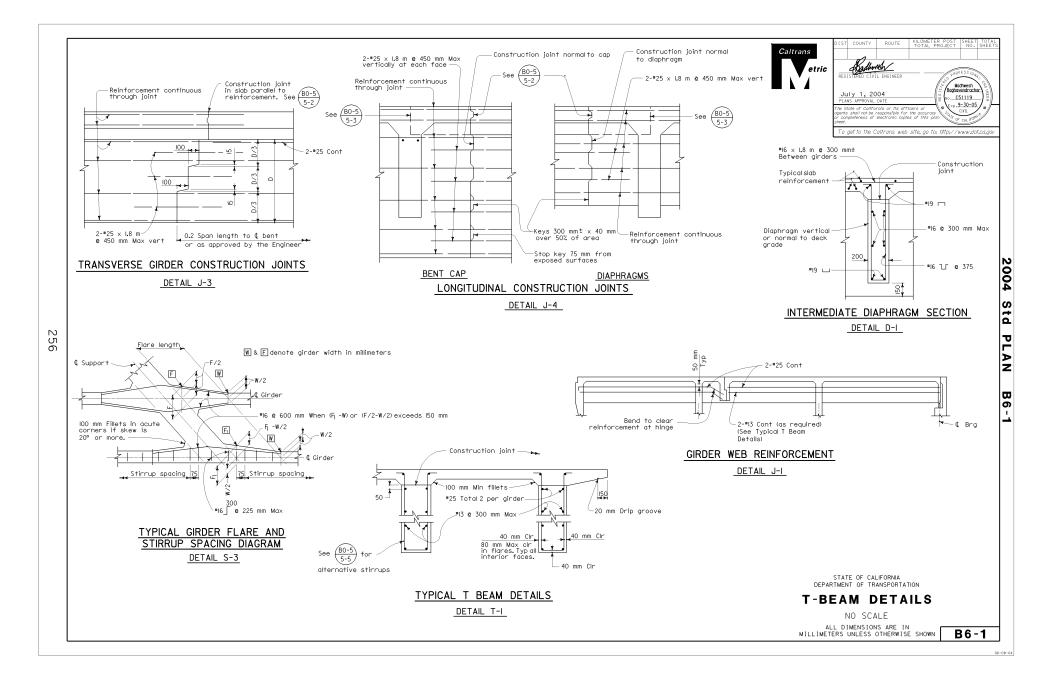
**B3-7** 

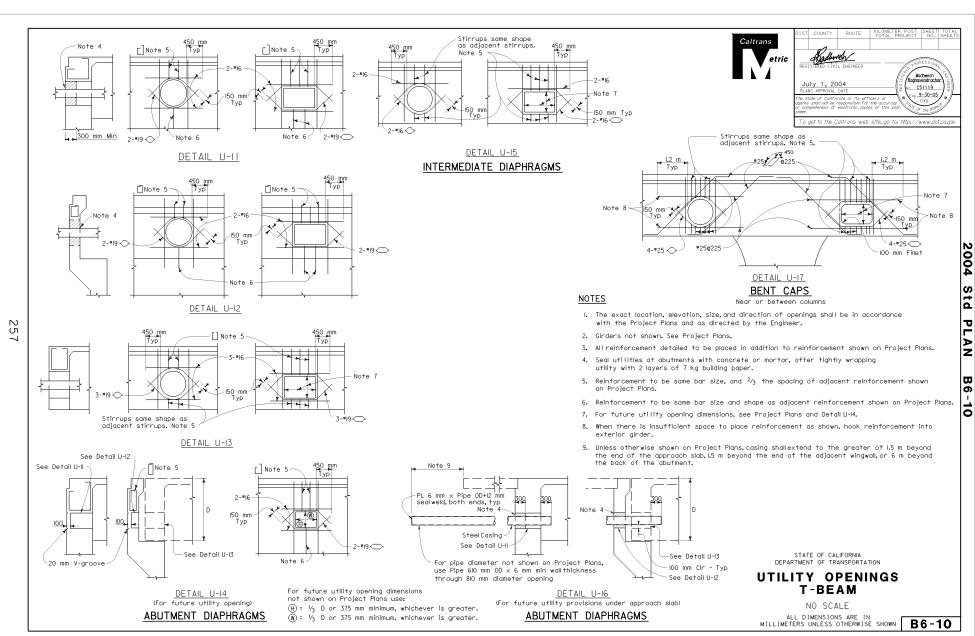


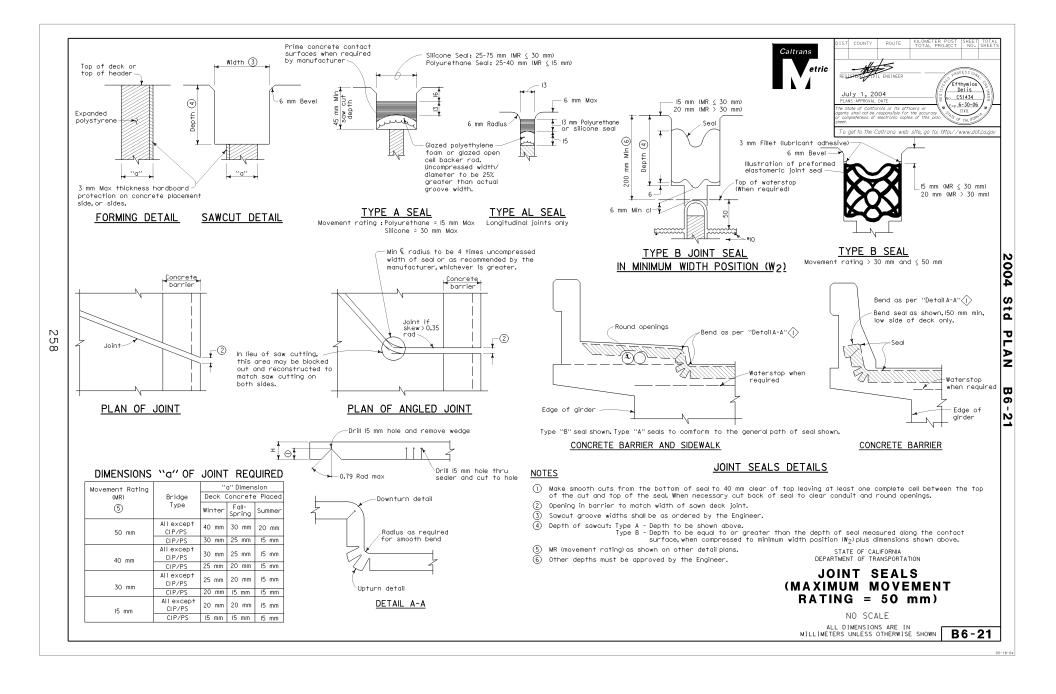


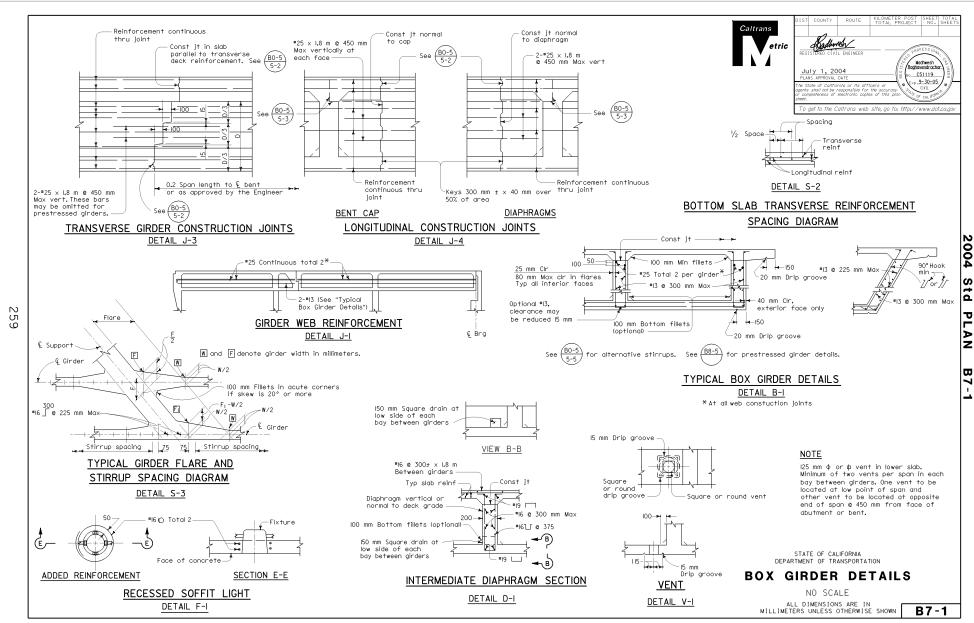


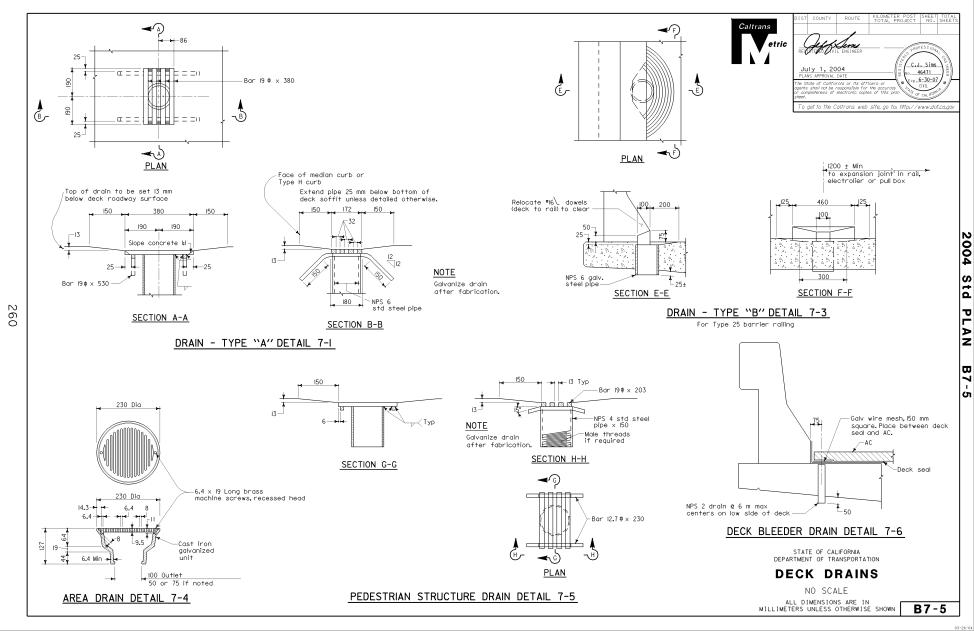


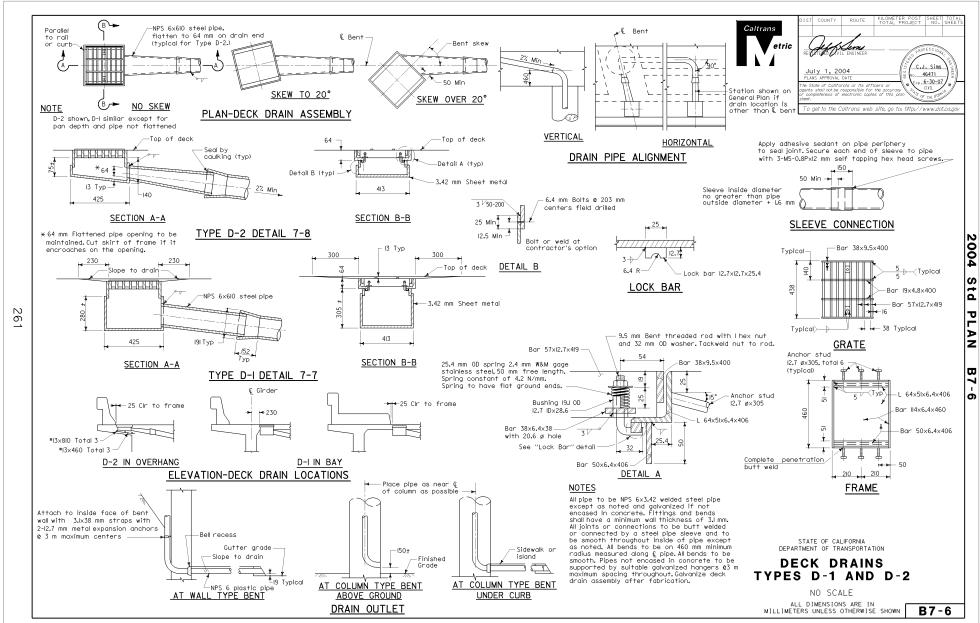


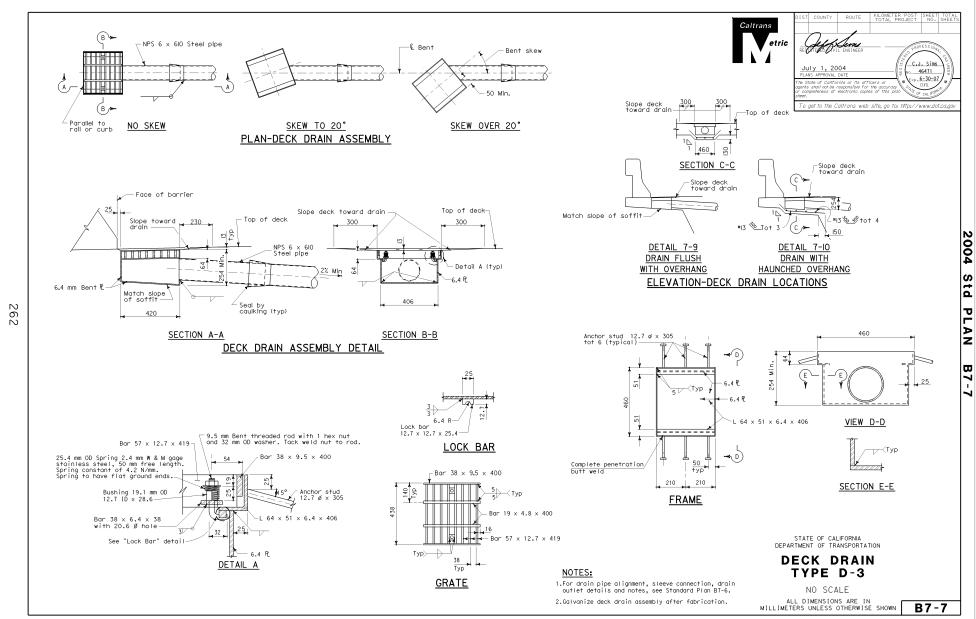


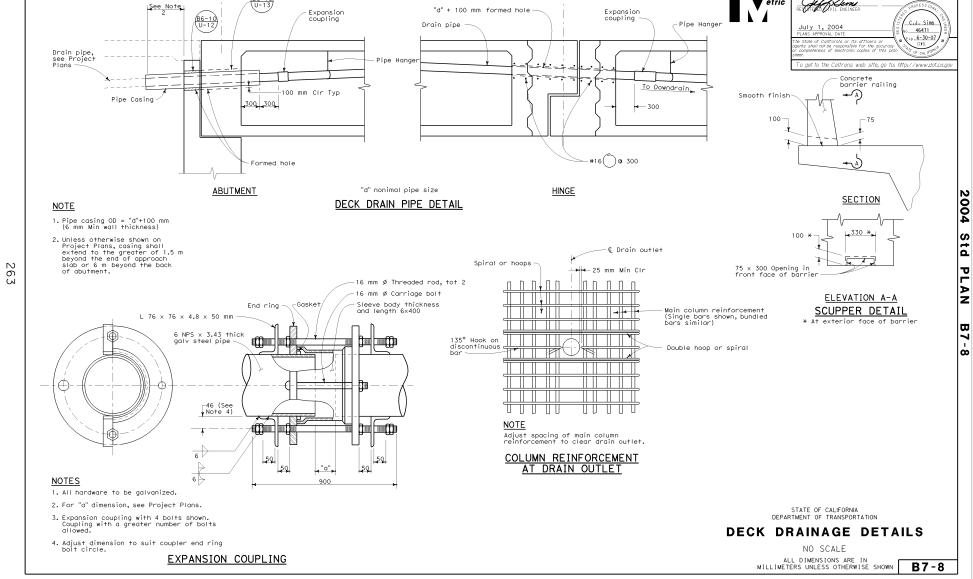








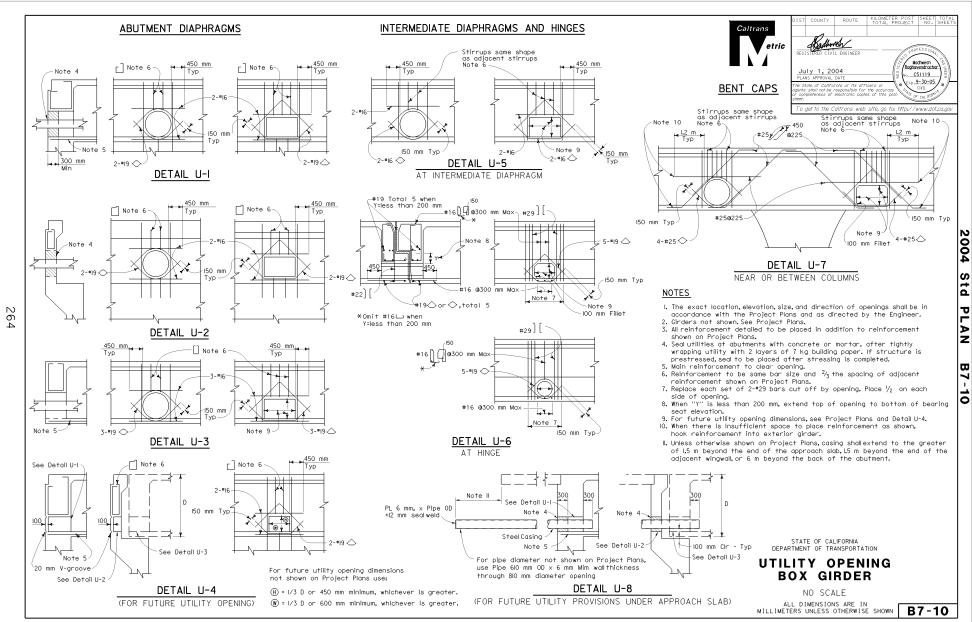


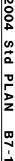


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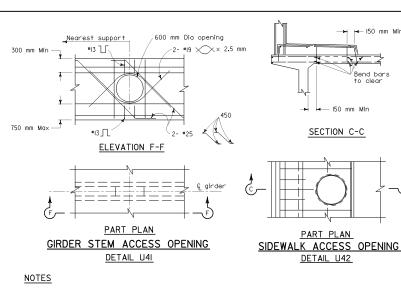
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· © Hinge

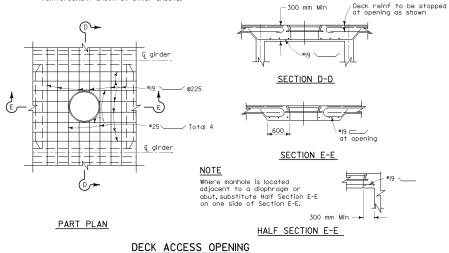




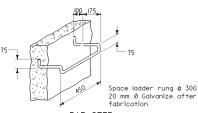




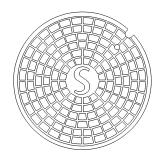
- I. For exact location of openings see other sheets. 2. Location and size of manholes may be modified as
- directed by the Engineer, provided minimum dimensions are maintained.
- 3. All reinforcement detailed to be placed in addition to reinforcement shown on other sheets.



DETAIL U43



## BAR STEP LADDER RUNG DETAILS DETAIL U44



### TOP OF MANHOLE COVER



### SECTION THROUGH FRAME

# NON-ROCKING MANHOLE FRAME & COVER FOR DECKS DETAIL U45

⊢ I50 mm Min

Bend bars

→ 150 mm Min

SECTION C-C

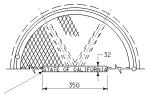
PART PLAN

DETAIL U42

- I. The manhole frame and cover shall be made of gray cast iron. Mass for payment is 200 kg.
- 2. All parts of the manhole frame and cover except machined surfaces shall be coated with asphaltum
- 3. The manhole frame and cover shall be tested for accuracy of fit and shall be marked in sets before delivery. The cover shall fit the frame snugly but not tightly.
- Covers for use on sewer structures shall bear the letters "S"; on storm drain structures the letter "D"; on openings for utilities the letter "U".
- 5. The mass shall not vary more than ten percent from the mass for payment.
- 6. Step inserts may be substituted for the standard step detail. Step inserts shall comply with State Industrial Safety requirements.

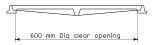






Letters 25 mm high. No other inscription to appear on exposed surfaces.

### TOP OF MANHOLE FRAME & COVER



SECTION THROUGH FRAME & COVER

# MANHOLE FRAME & COVER FOR SIDEWALKS DETAIL U46

### NOTE

Frame and cover shall be cast iron. Mass for payment is 110 kg.

Galvanize complete assembly after fabrication.

The mass shall not vary more than ten percent from the mass for payment.

Cover shall be supplied with bolt down or locking

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### UTILITY DETAILS

NO SCALE

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### NOTES

Start flares

Distribution of prestressing force:

Unless otherwise noted, the prestressing force shall be distributed with an approximately equal amount in each girder and shall be placed symmetrically about the center line of the structure. In slabs, the prestressing force shall be uniformly distributed across the slab.

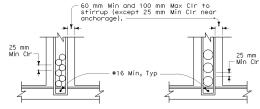
### Stressing sequence:

No more than  $\frac{1}{2}$  of the prestressing force in any girder may be applied before an equal force is applied in the adjacent girders. The maximum force variation between girders shall also not exceed the prestressing force of the largest fendom used in all girders. At no time during stressing operations will more than 1/6 of total prestressing force be applied eccentrically about the centerline of the structure.

Girder stem may be flared near anchorage to provide clearances for the particular anchorage system.

Place duct ties, as shown for flare girder stem, at each location where ducts change horizontal direction.

Bar reinforcement interfering with the prestressing tendon alignment shall be adjusted, as approved by the Engineer.



DUCTS 114 mm OD AND LESS

DUCTS OVER 114 mm OD

### CLEARANCE REQUIREMENTS FOR DUCTS

### NOTES

- Duct patterns shown are for a 300 mm wide girder stem. For other widths the minimum clearances must be maintained.
- 2. I Stirrups may also be used. For continuous stirrups in girder stems greater than 400 mm wide (ie: at flares) use 2-#16 minimum [ or ].
- 3.100 mm minimum is not required if this detail is used at hinge location.
- 4. For additional details, see Standard Plan B7-1.
- 5. Approval of the Engineer is required for deviations.

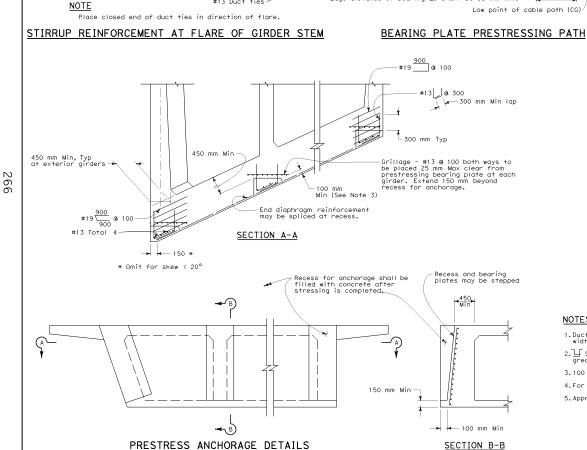
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## CAST-IN-PLACE PRESTRESSED GIRDER DETAILS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

B8-5

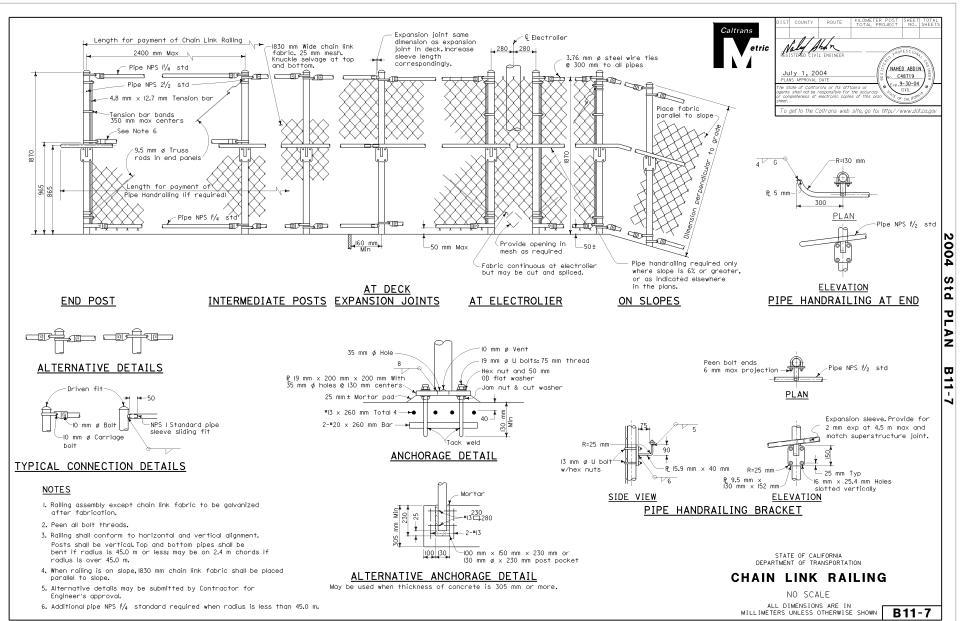


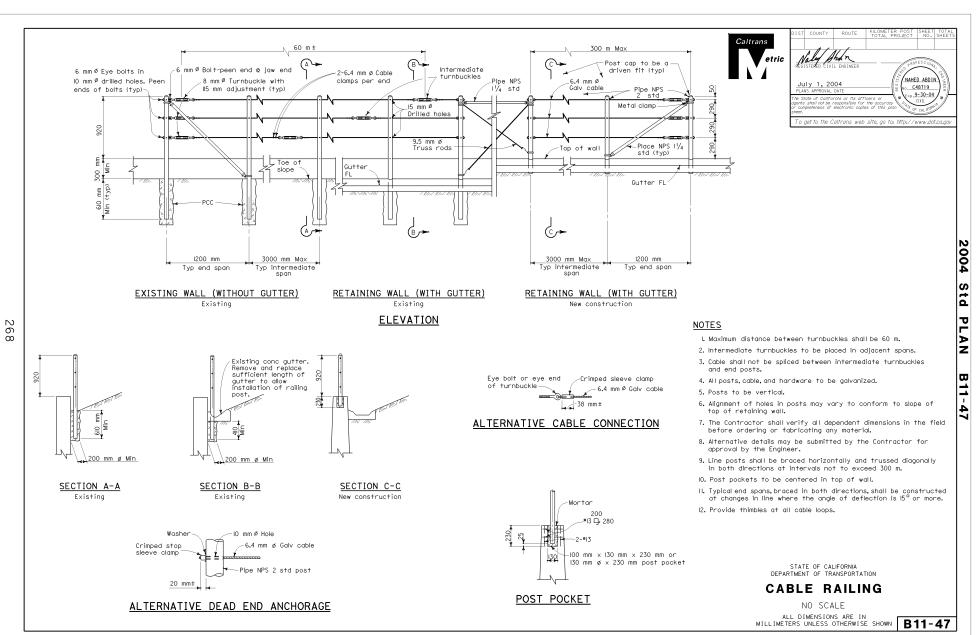
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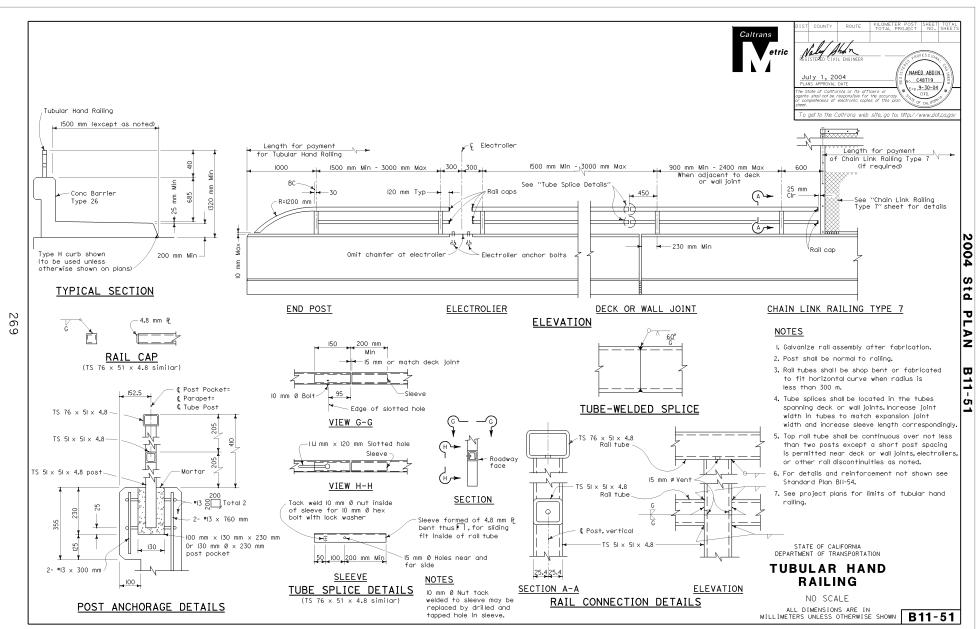
Ducts

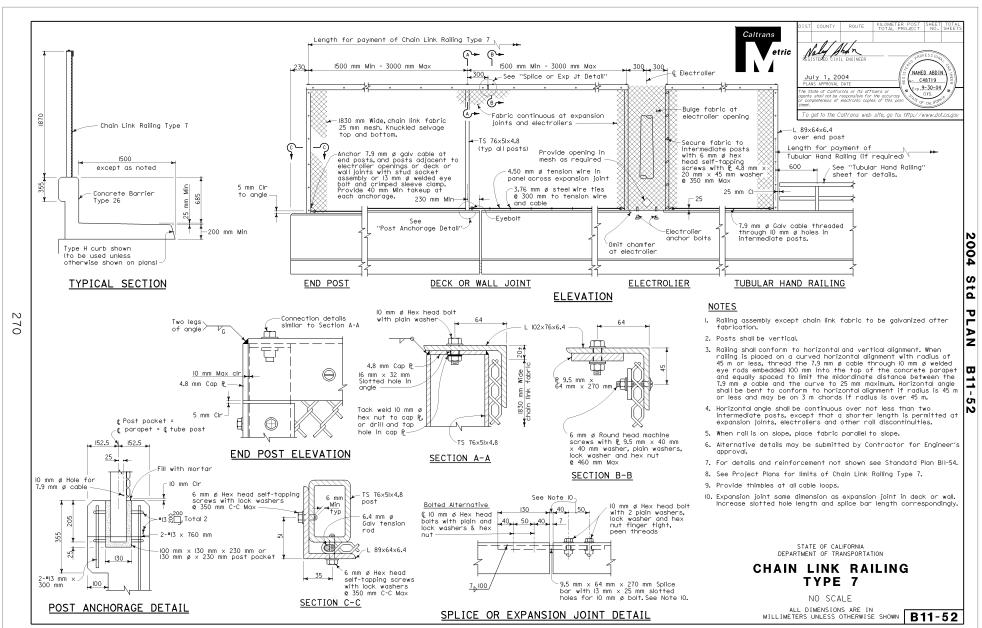
PLAN

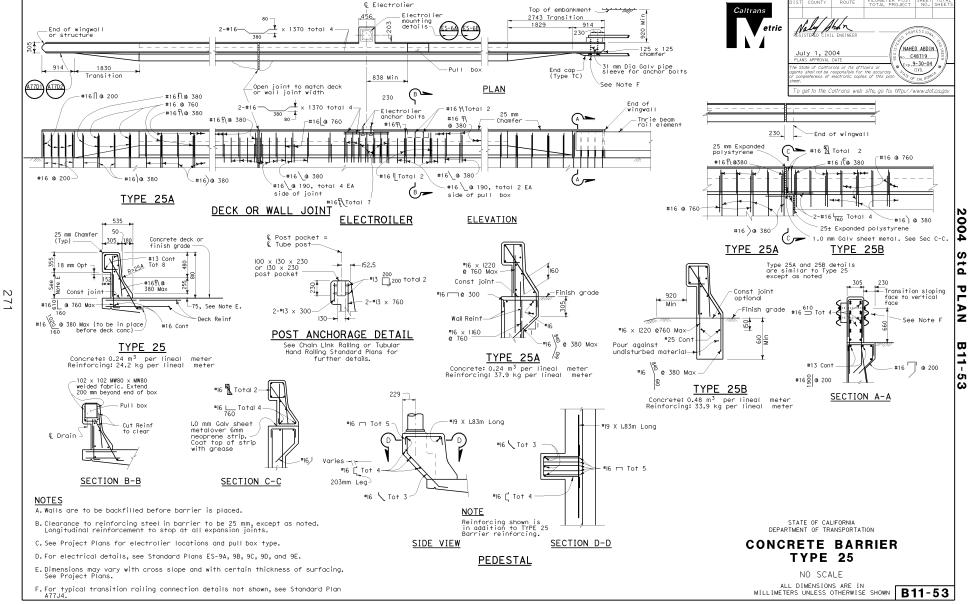




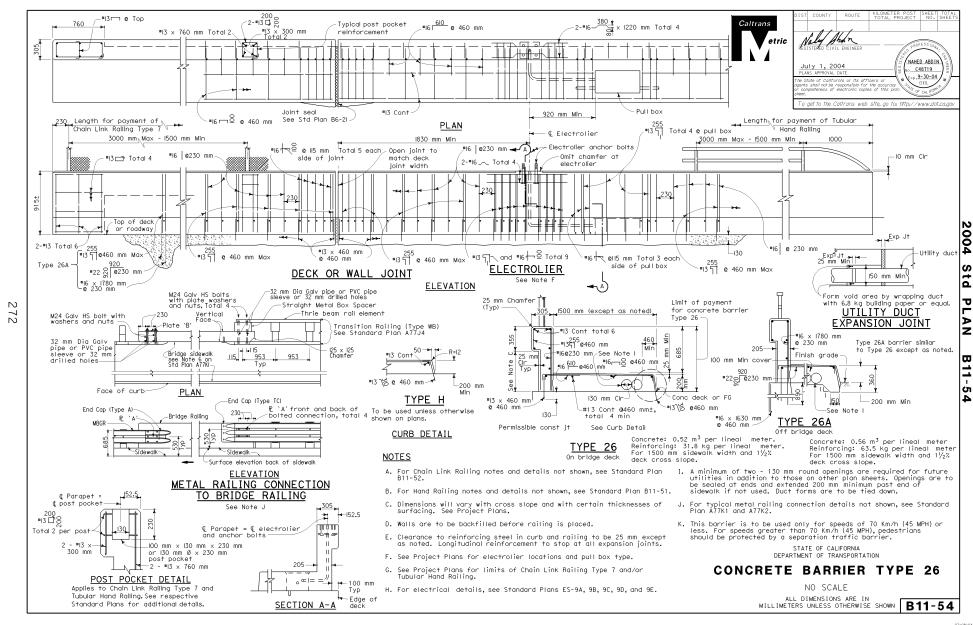


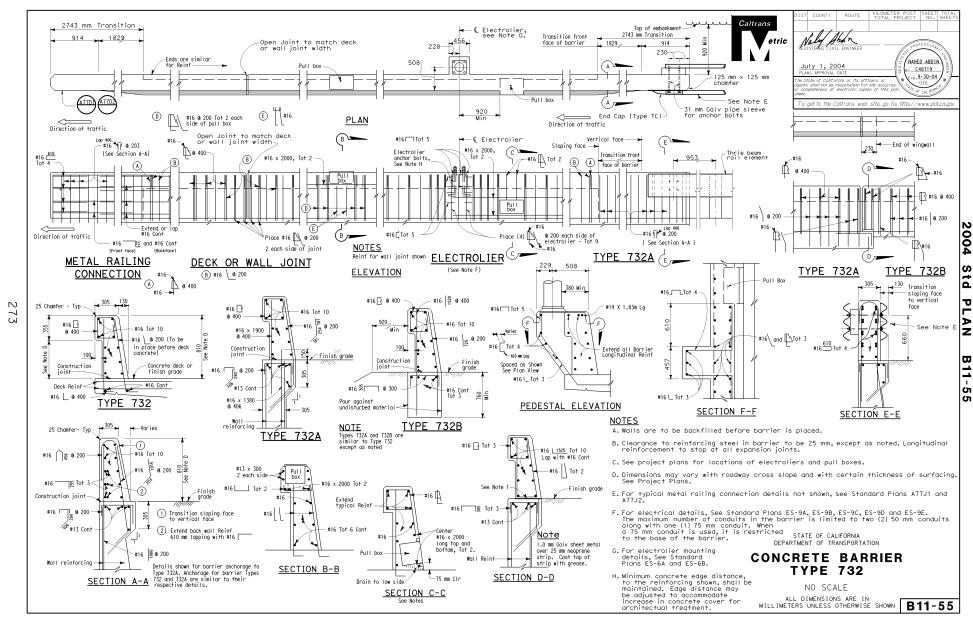


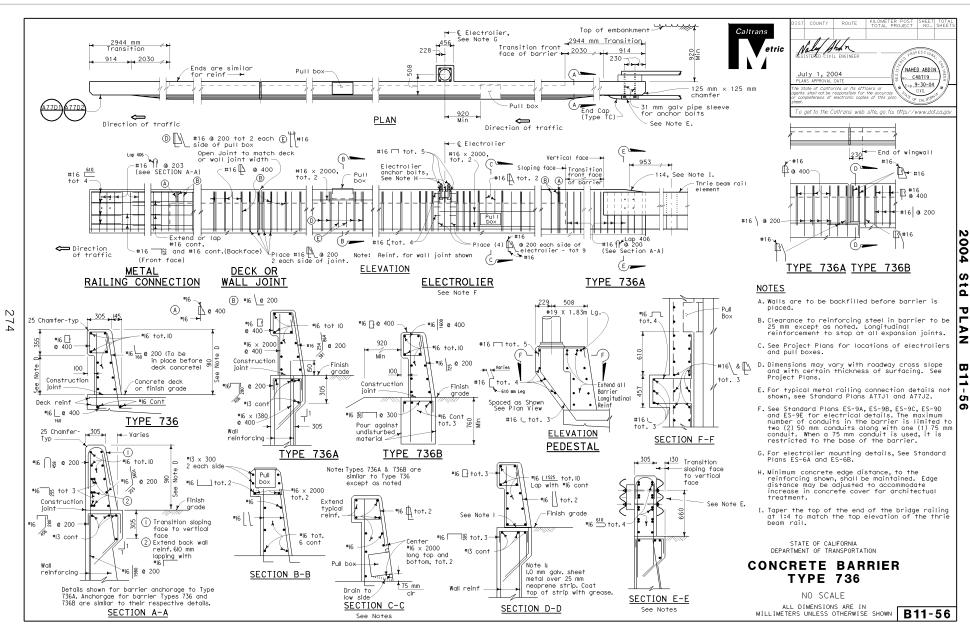


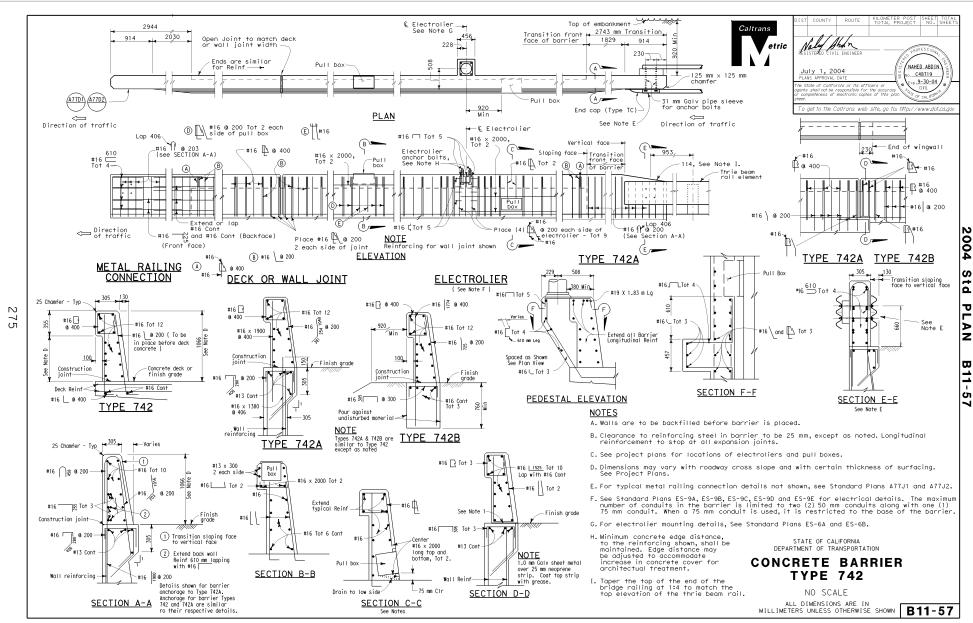


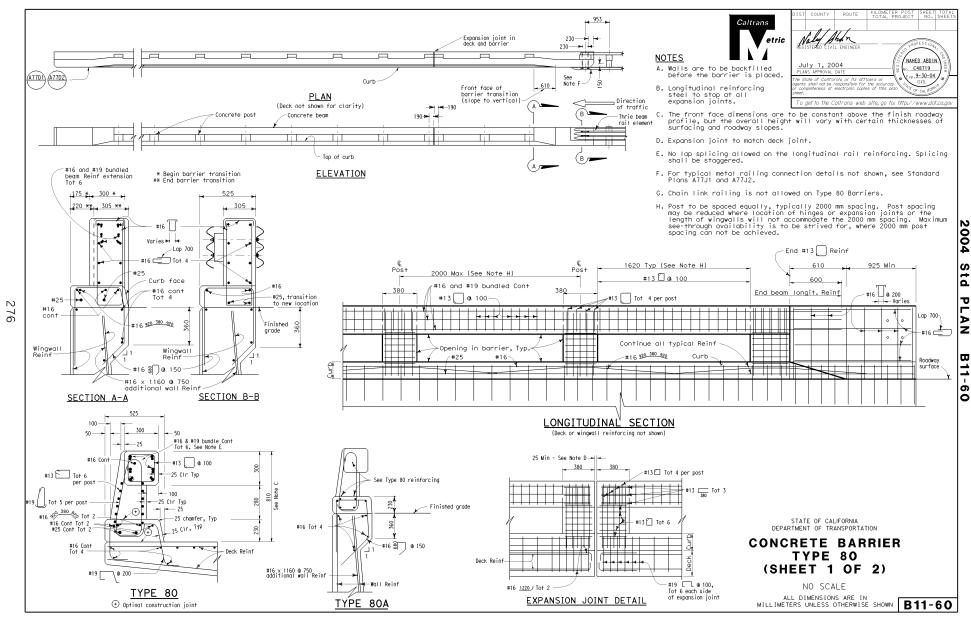
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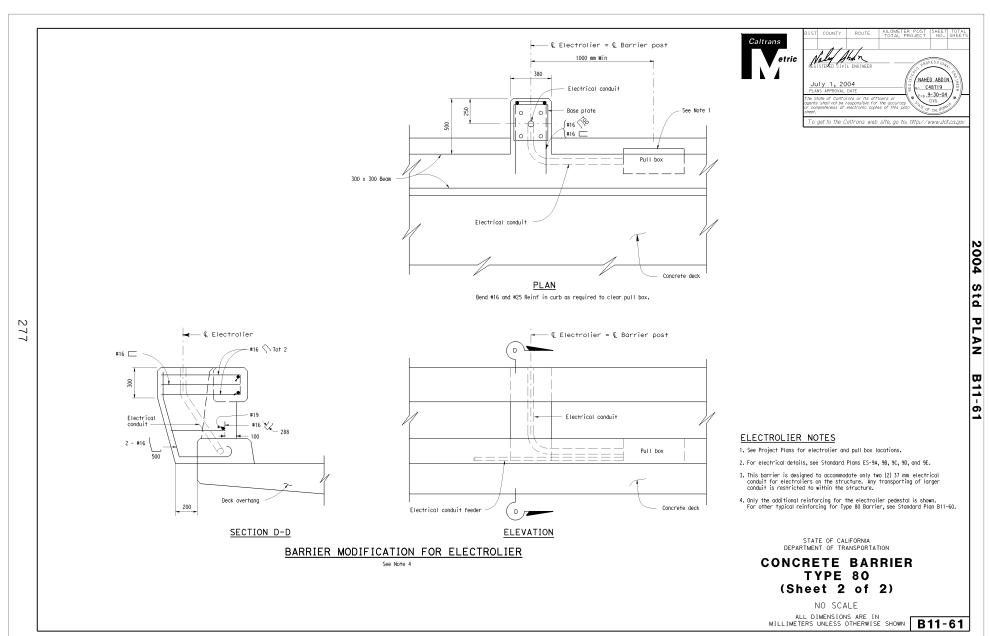




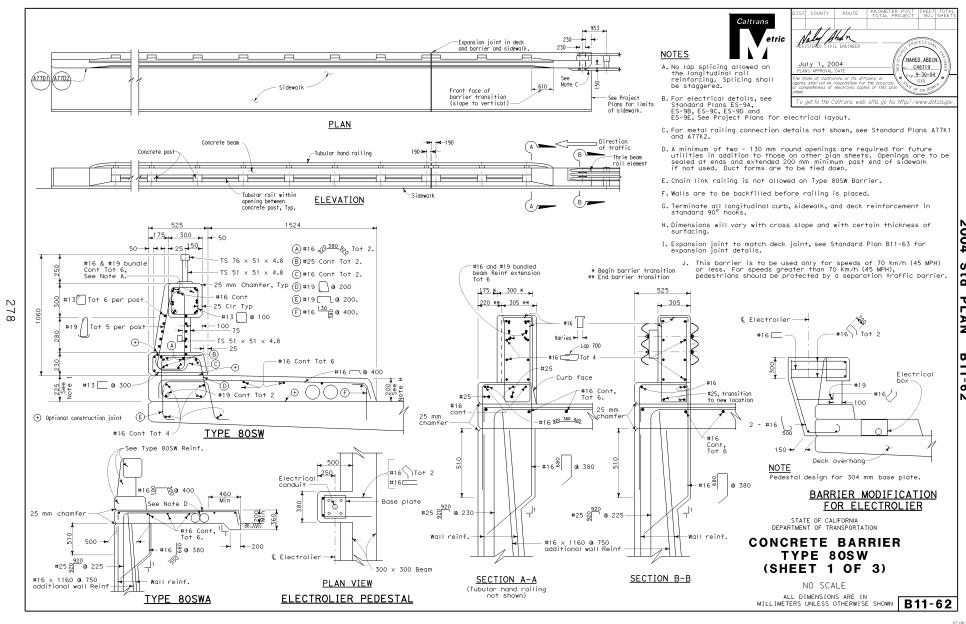


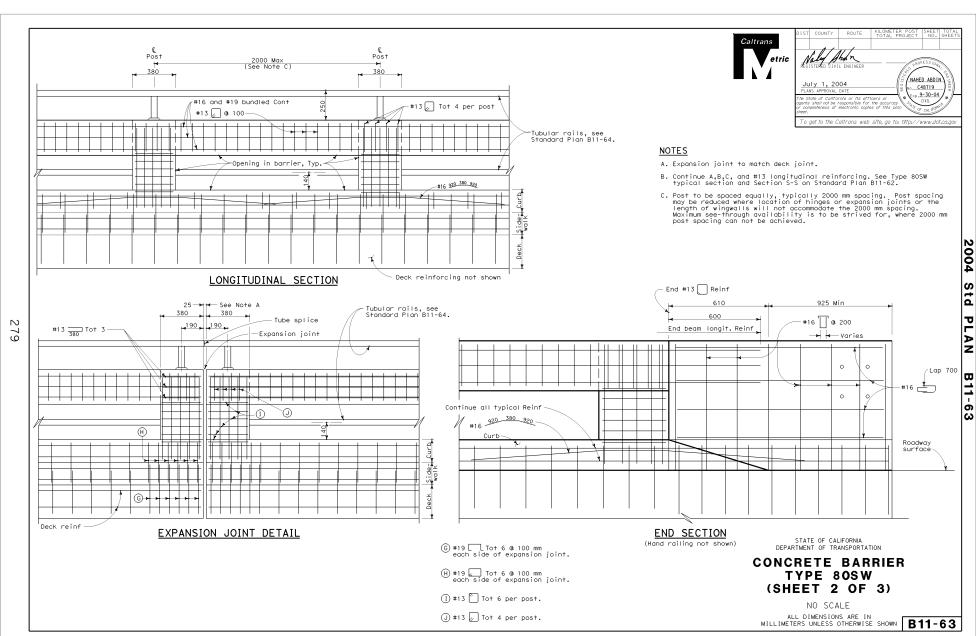


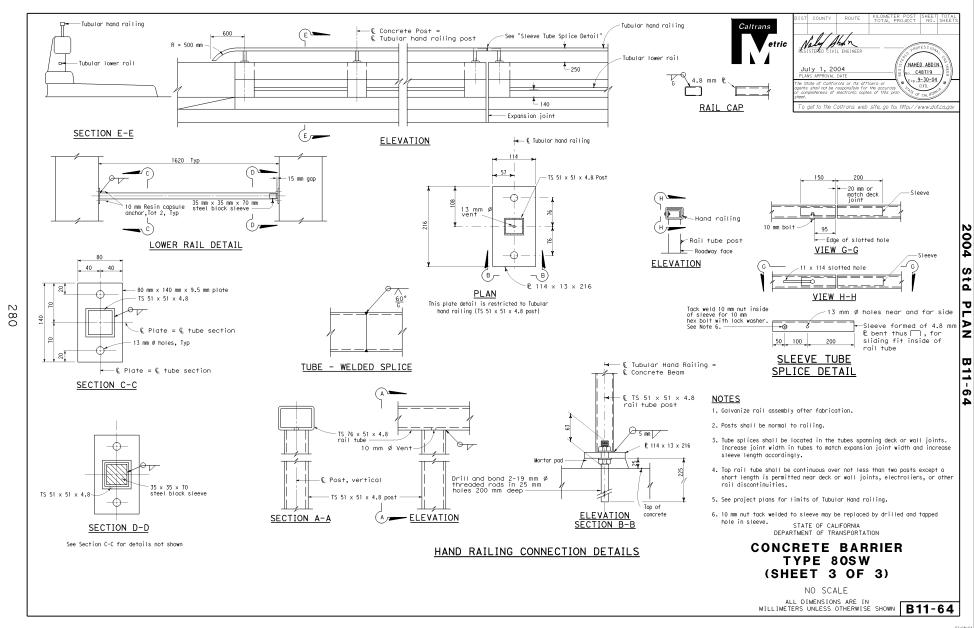


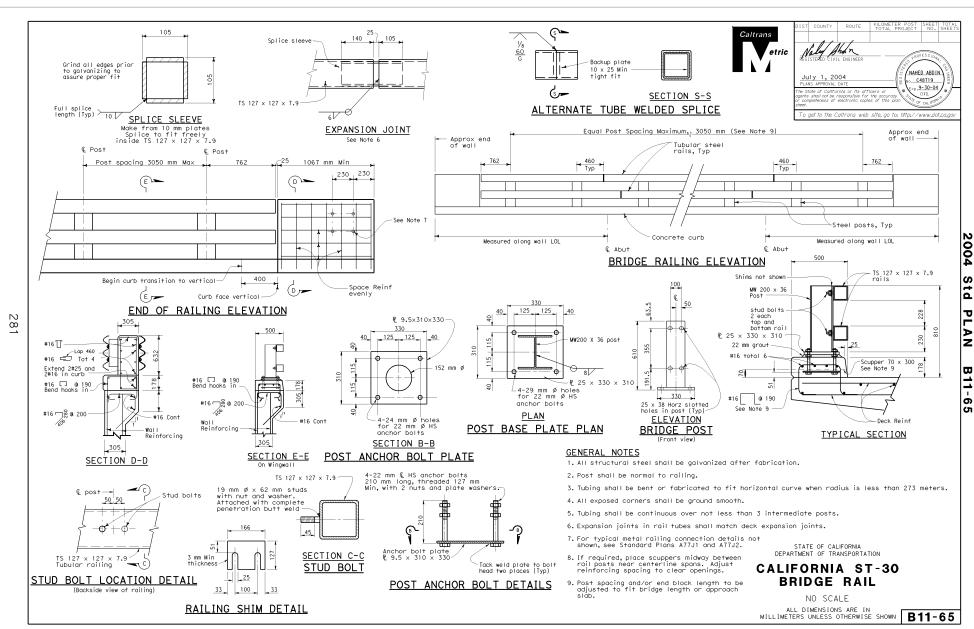


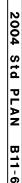




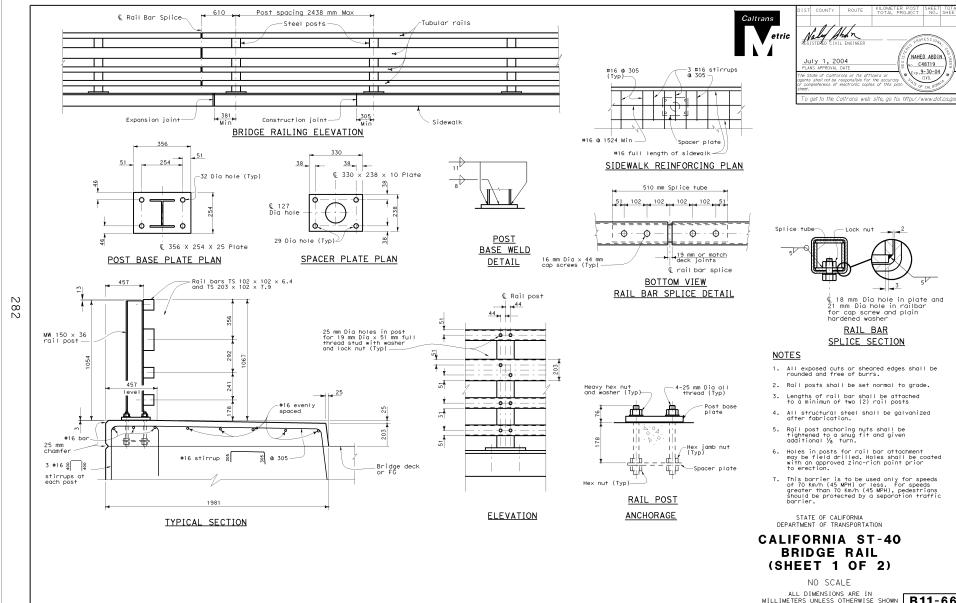






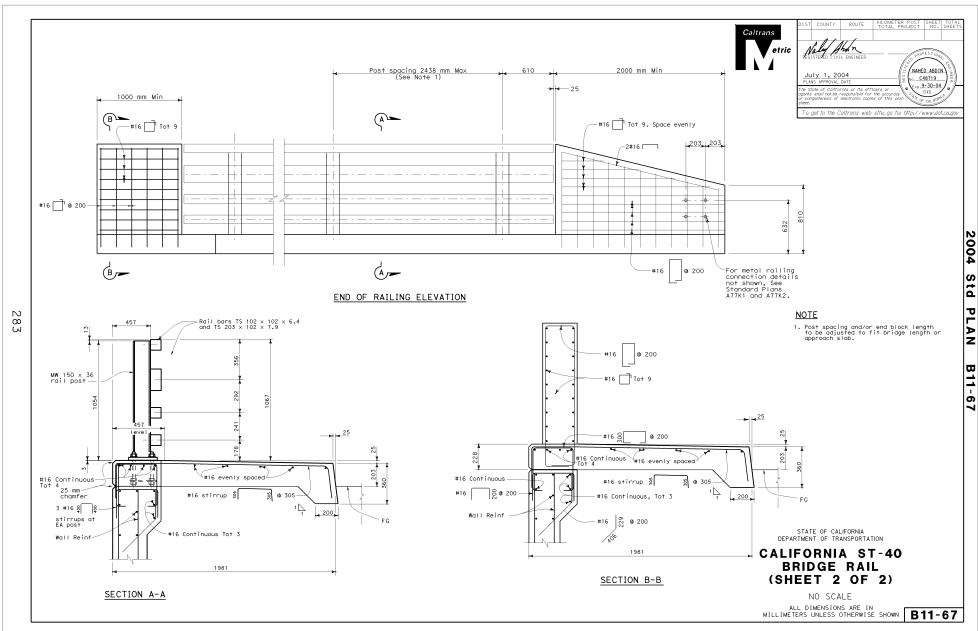


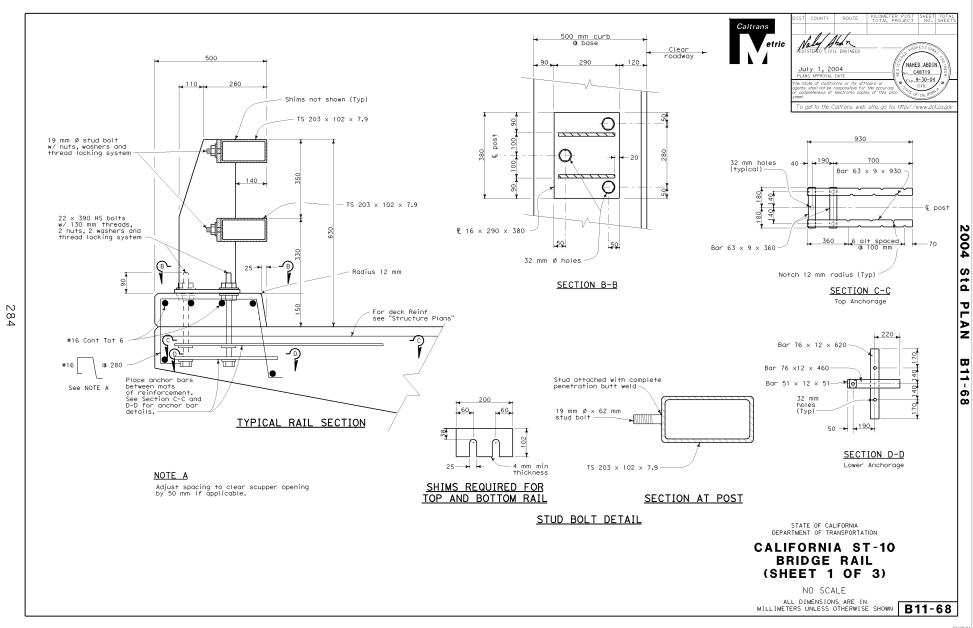
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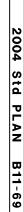


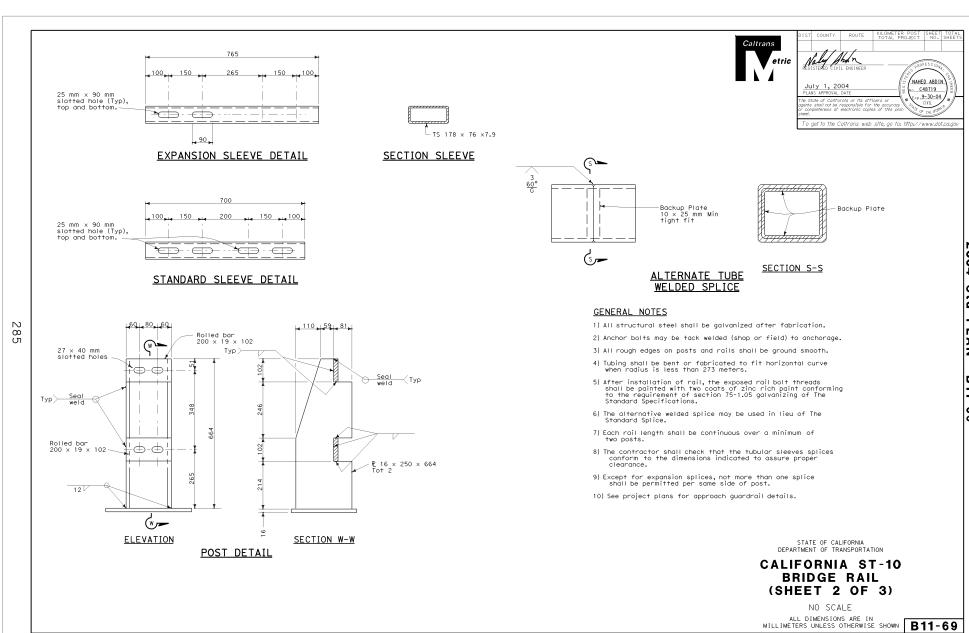
B11-66

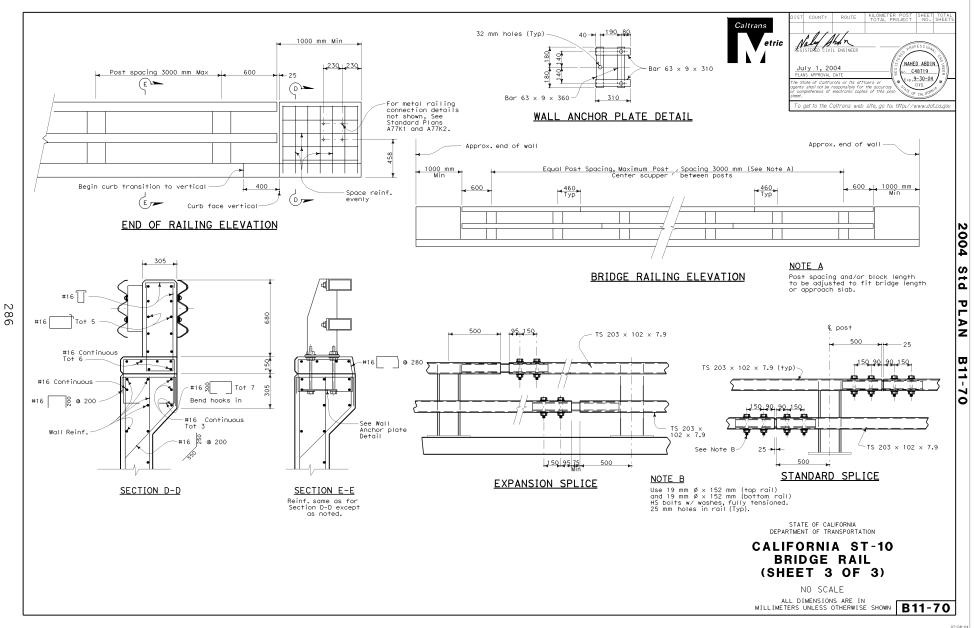
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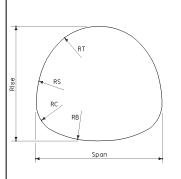


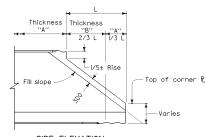






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## SIDE ELEVATION

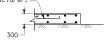
Thickness "B" two thicknesses greater than thickness "A", except for 6.5 mm and 7 mm thicknesses. Skew-bevels not permitted with Alternative  $\boldsymbol{\mathsf{I}}_{\!\boldsymbol{\mathsf{c}}}$ Cutoff dimensions are approximate only and may be varied by fabricator to suit plate layout.

#### ALTERNATIVE I

MAXIMUM HEIGHT OF FILL (m)														
					Thick	ness (	(mm)				LAYOUT DATA			
Span	Rise	2.5	3.5	4.5	2.5	3.5	4.5	5.5	6.5	7.0	(mm)			
(mm)	(mm)	Soil Pressure 144 KPa			For	For soil pressures see Table A					RT	RS	RC	RB
3708	3353	4.9	4.9	4.9	5.2	7.9	10.0	14.0	16.5	18.0	1727	2362	965	3404
3937	3429	4.6	4.6	4.6	4.9	7.3	9.4	13.1	15.5	17.1	1854	2413	965	3658
4013	3632	4.3	4.3	4.3	4.9	7.3	9.4	12.8	15.2	16.8	1854	2616	965	4039
4216	3734	4.0	4.0	4.0	4.6	6.7	8.8	12.5	14.6	15.8	1956	2743	965	4166
4293	3912	4.0	4.0	4.0	4.6	6.7	8.8	12.2	14.3	15.5	1956	2921	965	4623
4420	4115	4.0	4.0	4.0	4.3	6.4	8.5	11.9	14.0	15.2	1981	3327	965	4420
4521	4267	4.0	4.0	4.0	4.3	6.4	8.2	11.6	13.7	14.9	2007	3454	965	4877
4724	4369	3.7	3.7	3.7	4.0	6.1	7.9	11.0	13.1	14.3	2134	3505	965	5105
4801	4597		3.7	3.7		6.1	7.9	10.7	12.8	14.0	2108	3810	965	5385
4978	4699		3.7	3.7		5.8	7.6	10.4	12.2	13.4	2184	3988	965	5461
5004	4902		3.4	3.4		5.8	7.6	10.4	12.2	13.4	2235	4013	965	6883
5105	4953		3.4	3.4		5.8	7.3	10.0	11.9	13.1	2261	4242	965	6274
5258	5182		4.3	4.3		5.5	7.0	9.8	11.6	12.8	2286	4420	1194	5461
5588	5156			4.0			6.7	9.1	11.0	11.9	2515	3988	1194	6325
5842	5232			4.0			6.4	8.8	10.7	11.6	2667	3962	1194	6706
5944	5359			3.7			6.4	8.8	10.4	11.3	2718	4013	1194	7544
6198	5436							8.5	10.0	11.0	2870	3962	1194	7976

Structures require strutting for fill heights below heavy lines. See Note A.

20 mm ø Hook bolts @ 600 mm ± centers. Length as provided by manufacturer.



## SECTION A-A

TABLE A

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Soil Pressure kPa

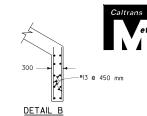
Thickness (mm)

2.5 3.5 4.5 5.5 6.5 7.0

163 239 316 431 508 555

192 239 345 402

Reinforce both faces of concrete collar with \*13 @ 450 mm both ways.Maximum skew is 35°.



Dallas Forester C37765 p 12-31-04 CIVIL To get to the Caltrans web site, go to: http://www.dot.ca.go

Thickness "A" 1200 Varies Detail B 900 mm Min or as directed by the Engineer SIDE ELEVATION

← 600 mm Min Optional shape

END ELEVATION

ALTERNATIVE 2

## END BEVELS

Spans

3708 to 5105

5258 to 6198

#### NOTES

- A. For strutting requirements of structural steel plate vehicular undercrossing during construction, see Standard Plan D88A.
- B. Minimum cover from crown to shoulder hinge point =  $1.5 \, \text{m}$ .
- C. Backfill shall be brought up uniformly on both sides of the structure.
- D. Minimum cover for construction loading, see Standard Plan D88.

Reinforced concrete:  $F_S$  = 165 MPa N = 10  $F_{\rm C}$  = 9 MPa

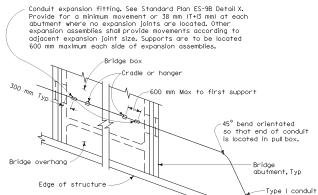
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## STRUCTURAL STEEL PLATE **VEHICULAR UNDERCROSSING**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN B14-1

2004 Std PLAN



# COMMUNICATION OR SPRINKLER CONTROL CONDUITS

Expansion fitting/coupling

Size 53 maximum

Size 78 maximum

-Coupling

Size 53 maximum

Details of electrical conduit system are to supplement those shown on the L. 2.0 M + V

See Detail B

NOTE

 $\infty$ 

 $\alpha$ 

NOTES

Road Plans.

(O)

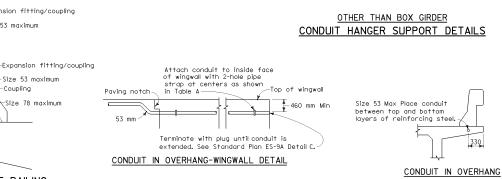
(O)

CONDUIT IN BRIDGE RAILING

straight run across the bridge without pull boxes.

I. The maximum conduit sizes shown are for a

In a bridge railing with lighting standards or pull boxes, reduce size of affected conduits as needed.



#5 Concrete pull

box and extension.

See Standard Plan ES-8.

Finished

arade-

Water supply line. For details, see Standard Plans BI4-4 and BI4-5.

Conduit or water line shall be 1400 mm minimum depth in area

of guard railing-

Bridge layout line

Rod with 2 hex nuts

insert @ centers as

and cast-in-place

shown in Table A

-¢ Box

600

-Cap

-Strap

DETAIL B

Type conduit - Dike

Type I conduit

-Shoulder

#### CONDUIT LOCATIONS

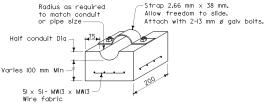
(For 53 mm conduit only except as noted) For location see Bridge Detail plans.

#### TABLE A

Conduit	Size 63 or less	Size 78	Size 9I		
Rod	IO mm ø	I3 mm ø	I6 mm ø		
Strap	2.28 mm × 25.4 mm	2.28 mm × 25.4 mm	2.66 mm × 38 mm		
Support spacing	3.05 m	3.05 m	3.05 m		

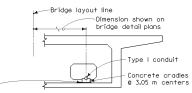


	DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL						
ic	HAS APPROVAL DATE    ASSUMPTION   Prince   Princ											
	agents	shall not be i	rnia or its affi respansible for electronic copie	the accuracy S		*						



- I. Cradles to be precast concrete.
- 2. Secure all cradles to bottom slab of bridge with epoxy adhesive, except as provided below.

#### CONCRETE CRADLE



Under the first cradle support inside bridge near abutment or hinge, epoxy [2 gage galvanize steel sheet (800 mm  $\times$  400 mm) to the floor of cell. Do not secure cradle to steel sheet. Cradle shall be free to slide to accommodate lateral movement.

## **BOX GIRDER** CONDUIT SUPPORT DETAILS

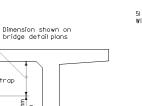
STATE OF CALIFORNIA

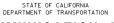
#### **COMMUNICATION AND** SPRINKLER CONTROL CONDUITS (CONDUIT LESS THAN SIZE 103)

NO SCALE

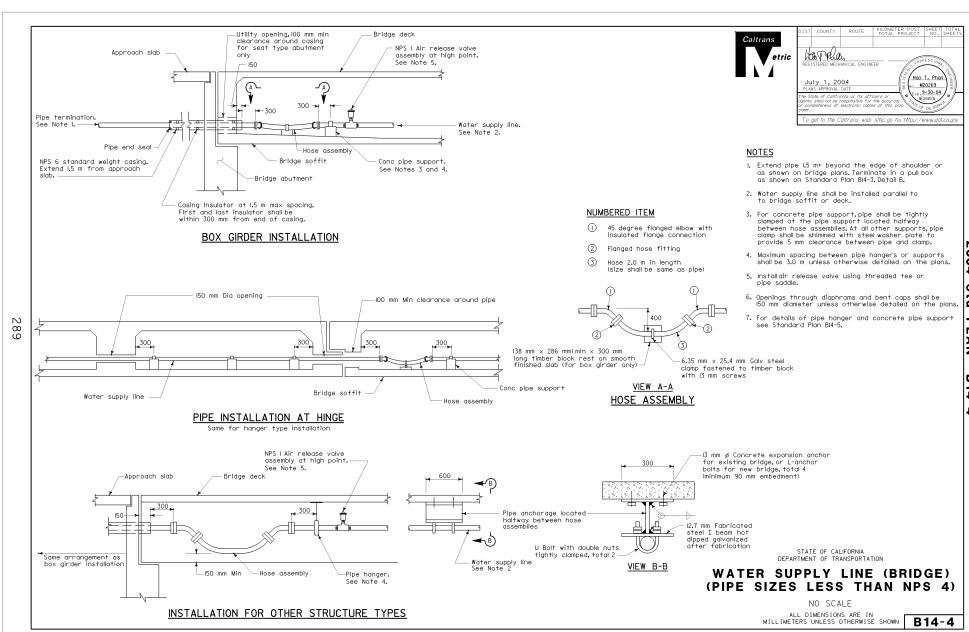
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MILLIMETERS UNLESS OTHERWISE SHOWN

B14-3





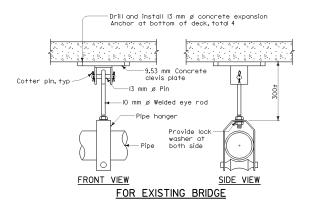




Hao T. Phan July 1, 2004 кр. 9-30-04 he State of California or its officers or

get to the Caltrans web site, go to: http://www.dof.ca.g

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Rebar 10 mm ø Welded linked eye rods Provide lock-washer at -Pipe hanger both side

FOR NEW BRIDGE

PIPE HANGER

-IOO mm Min

8-60 mm Dia hole Parallel to transverse reinforcement ₩ 14-- 600 #16 Ö , Total 2 - 800 mm Dia 4.166 mm steel sheet each opening 25 mm Cir

> Locate where called for on bridge plans. Adjust reinforcement to clear opening. Plate must be installed before top deck is placed.

SOFFIT ACCESS OPENING

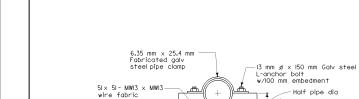
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## WATER SUPPLY LINE (DETAILS) (PIPE SIZES LESS THAN NPS 4)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

B14-5

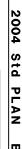


adhesive

Bridge soffit-

290

300 (200 mm deep) CONCRETE PIPE SUPPORT



ialas J. Duni

C47240 12-31-05

#13 @ 816

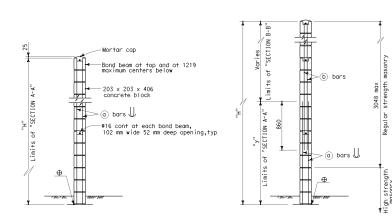
#16 @ 406

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CASE 2

For details not shown, see Case 1. Level ground (±10%) on the traffic side of the soundwall and sloping ground on the opposite side.





CASE 1

For details not shown, see Case 2. Level ground (±10%) on both sides of the soundwall.

75 clr-

Top of footing

H=4877

#### H=1829 thru H=3048 TRENCH FOOTING CASE 1 CASE 2 Maximum 0 = 25 D n D D D 1829 1300 1100 900 1800 1400 1829 1500 1300 1100 2200 1700 2438 2438 3048 1800 1500 1200 2500 1900 3048 3658 2000 1700 1400 2700 2100 3658 4267 2200 1800 1500 3000 2400 4267 4877 2400 2000 1700 3200 2500 4877

Case 1 - Level ground ( $\pm 10\%$ ) on both sides of the soundwall.

Case 2 - Level ground ( ±10% ) on traffic side of the soundwall and sloping ground on opposite side.

## SPREAD FOOTING

Maximum H	w
1829	1000
2438	1300
3048	1500
3658	1800
4267	2000
4877	2300

# SOUNDWALL REINFORCEMENT TABLE

Caltrans

Slope control point.

Slopes shall not be steeper than 1:2

SPREAD FOOTING SECTION

- Ground line to be at the same elevation on both sides of the soundwall. Soundwall shall not be used to retain earth, typ.

- #13 tot 4

-#13 tot 2

#13 @ 460 max

etric

#### (a) bars (b) bars f'm Compressive Strength of CMU Maximum (MPa ( MPa ) @ 406 max @ 406 max 1829 #13 10.34 13.1 1829 2438 #13 10.34 2438 3048 #13 10.34 13.1 3048 3658 #16 #13 1829 13.79 19.31 3658 4267 #19 #13 2438 17.24 25.86 4267 4877 #19 #13 3048 17.24 25.86 4877

# GENERAL NOTES

#### A.For type of block and joint finish, see other sheets.

- B. When blocks are laid in stacked bond, ladder type, galvanized joint reinforcement shall be provided. A minimum of 2-3.76 mm wires continuous at 1219 mm maximum to be used. Locate reinforcement in joints that are at the approximate midpoint between bond and beams.
- C. Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.
- D. For intermediate wall heights that are between the "H's" given, use the tabular information for the next higher "H".
- E.Masonry strengths are listed in the "SOUNDWALL REINFORCEMENT TABLE".

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## SOUNDWALL MASONRY BLOCK ON FOOTING DETAILS (1)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

B15-1

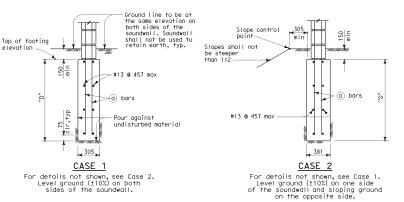
H=1829 THRU H=3048	H=3658 THRU
ls not shown, see H=3658 thru H=4877	For details not shown, see

## TYPICAL SECTION

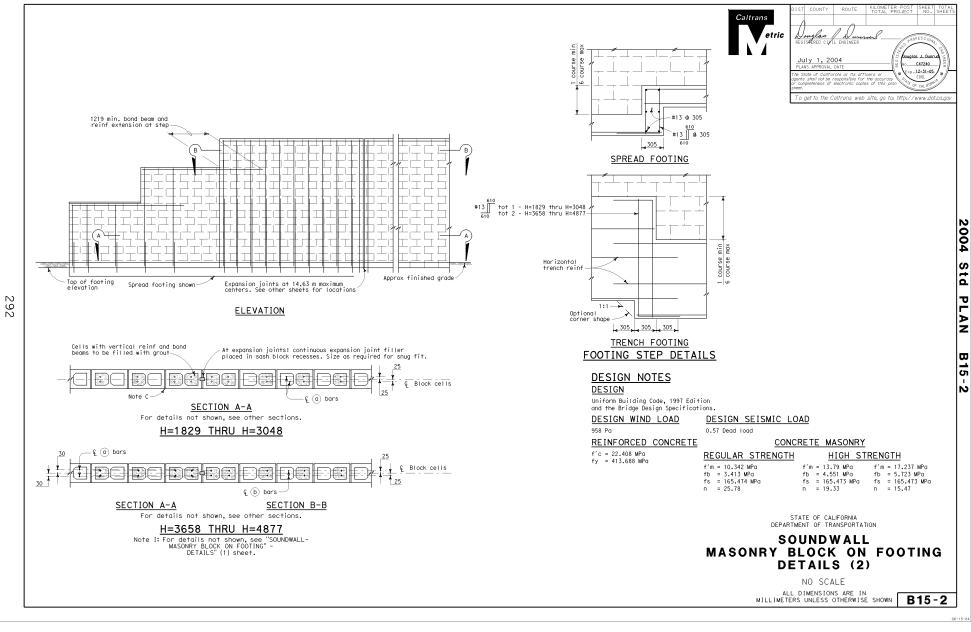
⊕Full mortar bed at bottom of wall

For detail

9



TRENCH FOOTING SECTION



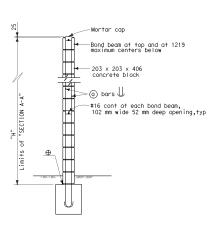


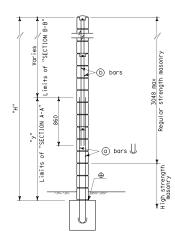




#### SOUNDWALL REINFORCEMENT TABLE

Maximum "H"	a bars @ 406 max	(b) bars @ 406 max	"Y"	f'm ( MPa )	Compressive Strength of CMU ( MPa )	Maximum "H"
1829	#13			10.34	13.1	1829
2438	#13			10.34	13.1	2438
3048	#16			10.34	13.1	3048
3658	#19	#13	1829	13.79	19.31	3658
4267	#19	#13	2438	17.24	25.86	4267
4877	#19	#13	3048	17.24	25.86	4877





## H=1829 THRU H=3048

For details not shown, see H=3658 thru H=4877

H=3658 THRU H=4877

For details not shown, see H=1829 thru H=3048

#### TYPICAL SECTION

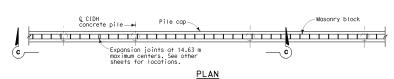
⊕ Full mortar bed at bottom of wall

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## SOUNDWALL MASONRY BLOCK ON PILE CAP DETAILS (1)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN B15-3



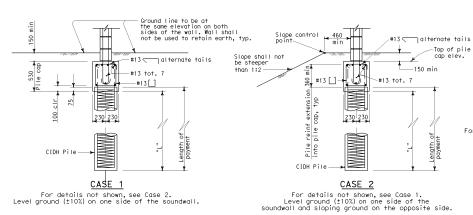
# - 1219 min. bond beam and reinf. extension at step Expansion joint DETAIL D finished ground 457 min Pile spacing

#### **ELEVATION C-C**

Note [ : For details not shown, see "SOUNDWALL - MASONRY BLOCK ON PILE CAP - DETAILS (2) and "DETAILS (3) sheets.

293

Note II: See "SOUNDWALL MASONRY BLOCK - MISCELLANEOUS DETAILS" sheet for other details.



PILE CAP SECTION



	DIST	COUNTY	ROUTE	KILOMETER P TOTAL PROJ		TOTAL
c	IJ.	nglas	1 Dum	ul	PROFESS 104	
	REGI	ISÆRED CI√I	L ENGINEER		Douglas J. Dunr	131
		I <b>ly 1, 20</b> NS APPROVAL			io. C47240	_ (m
	agents	shall not be i	rnia or its affi respansible for electronic copie		CIVIL OF CAL IPOS	
	Too	get to the C	altrans web	site, an to: htt.	n://www.do	t.ca.aav

#### GENERAL NOTES

- A.For type of block and joint finish, see other sheets.
- B. When blocks are laid in stacked bond, ladder type, galvonized joint reinforcement shall be provided. A minimum of 2-3.76 mm vires continuous at 1219 mm maximum to be used. Locate reinforcement in joints that are at the approximate midpoint between bond beams.
- C. Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.
- D.For intermediate wall heights that are between the "H's" given, use the tabular information for the next higher "H".
- E.Masonry strengths are listed in the "SOUNDWALL REINFORCEMENT TABLE".

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#### **DESIGN NOTES**

#### DESIGN

Uniform Building Code, 1997 Edition and the Bridge Design Specifications.

DESIGN WIND LOAD

DESIGN SEISMIC LOAD

958 Pa

f'c = 22.41 MPa fy = 413.7 MPa

0.57 Dead load

REINFORCED CONCRETE

CONCRETE MASONRY REGULAR STRENGTH HIGH STRENGTH

f'm = 10.34 MPafb = 3.41 MPa fs = 165.5 MPa

n = 25.8

f'm = 17.24 MPa fb = 5.72 MPa fs = 165.5 MPa n = 15.5 f'm = 13.79 MPa fb = 4.55 MPa fs = 165.5 MPa n = 19.3

At expansion joints: continuous expansion joint filler placed in sash block recesses. Size as required for snug fit. Cells with vertical reinf and bond beams to be filled with grout = t \_ 25 © Block cells −Ç @ bars

#### SECTION A-A

For details not shown, see other sections.

#### H=1829 THRU H=3048



For details not shown, see other sections.

H=3658 THRU H=4877

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## SOUNDWALL MASONRY BLOCK ON PILE CAP DETAILS (2)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



밑 A B15 **5** 



ualas J. Dunn

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-Pile cap reinf.

400 Pile diameter Pile reinf see Pile Data Tables MW55 Wire see Note 2 - ၉pile

SECTION E-E

# Pile cap reinf.

## PILE CAP STEP DETAIL

- I. For details not shown, see "SOUNDWALL MASONRY BLOCK ON PILE CAP DETAILS (1)" and "DETAILS (3)" sheets.
- II. Lapped splices in spiral reinforcement shall be lapped at least 80 wire diameters. Spiral reinforcement at splices and at ends shall be terminated with a 135° hook with a 150 mm tail hooked around a longitudinal bor.

#### DETAIL D \* @ 50 at option of contractor

-CIDH pile

Ç pî le →

229 -

#13 stirrup

MW55 spiral pitch———

filled with o

10 e rilled hol

295

Case 1 - Level ground (  $\pm 10\%$  ) on both sides of the soundwall

Pile hooks parallel to wall layout line

	CASE 1												
	Ø = 25 min				Ø = 30	min	Ø = 35 min						
Maximum H	S	L	Pile Reinf.	S	L	Pile Reinf.	S	L	Pile Reinf.	Maximum H			
1829	5000	1800	#19 tot. 7	5000	1400	#19 tot. 7	5000	1100	#19 tot. 7	1829			
2438	5000	2300	#19 tot. 7	5000	1800	#19 tot. 7	5000	1400	#19 tot. 7	2438			
3048	5000	2700	#22 tot. 6	5000	2100	#22 tot. 6	5000	1700	#19 tot. 7	3048			
3658	4700	2900	#25 tot. 7	4900	2400	#25 tot. 7	5000	1900	#25 tot. 7	3658			
4267	3500	2900	#25 tot. 7	3700	2400	#25 tot. 7	3800	1900	#25 tot. 7	4267			
4877	3400	3100	#25 tot. 7	3500	2600	#25 tot. 7	3700	2100	#25 tot. 7	4877			

PILE DATA

Case 2 - Level ground (  $\pm 10\%$  ) on traffic side of the soundwall and sloping ground on opposite side.

CASE 2											
		Ø = 30 i	min								
Maximum H	S	L	Pile Reinf.			Pîle Reinf.	Maximum H				
1829	5000	3400	#22 tot. 7	5000	2500	#22 tot. 6	1829				
2438	5000	4100	#22 tot. 7	5000	3000	#22 tot. 7	2438				
3048	5000	4800	#25 tot. 7	5000	3500	#25 tot. 7	3048				
3658	3800	4700	#25 tot. 7	4200	3700	#25 tot. 7	3658				
4267	2900	4600	#25 tot. 7	3200	3600	#25 tot. 7	4267				
4877	2700	4900	#25 tot. 7	3000	3900	#25 tot. 7	4877				

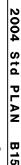
PILE DATA

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## SOUNDWALL MASONRY BLOCK ON PILE CAP DETAILS (3)

NO SCALE

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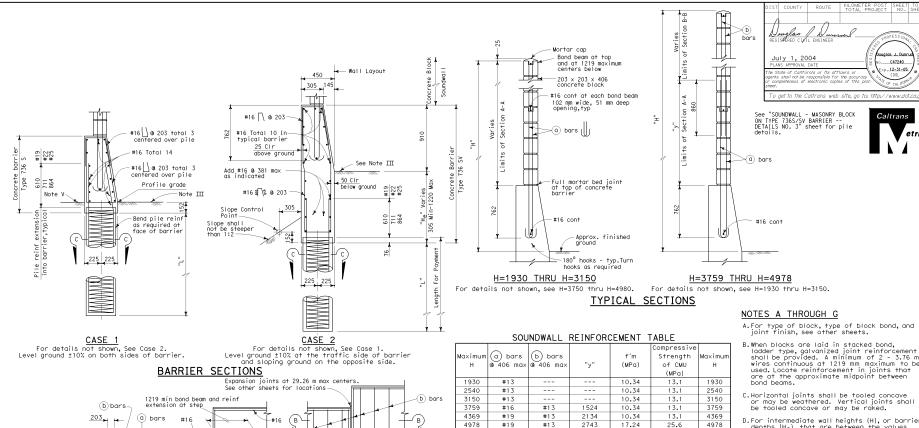


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Profile grade

 $\frac{1}{2}$  adjacent pile

457

CASE 2

For details not shown, See Case 1.

10 mm expansion ioint

PART ELEVATIONS

filler in concrete barrier

#16 0 406 max

between piles Pile spacing "S"

See Note IV

CASE 1

For details not shown, See Case 2.

9 0

203

a bars -

#16 2 spaces @ 203

each side of expansion

joint, typ Case 1 and Case 2

1 tot. 3 @ 203 centered

over piles, typ.

## NOTES I THROUGH VI

- I. Details shown are primarily to conform design of Details shown are primarily to conform design or soundwalls to Type 736S and Type 736 SV Concrete Barriers. For soundwall details conforming with barriers see "SOUNDWALL - MASONRY BLOCK ON TYPE 736S/SV BARRIER - DETAILS (2) and (3) sheets.
- II. For details not shown, see "SOUNDWALL MASONRY BLOCK ON TYPE 7365/SV BARRIER DETAILS NO. 2 and DETAILS NO. 3" sheets.
- III. Slope ground at traffic side of barrier to drain. Maximum slope ±10%. See Std. Plan B11-56, Note D.
- IV. Pile spacing may be varied, but shall not exceed the tabular values. See "DETAILS (3)".
- V. For Case 1 ground line to be at the same elevation on both sides of the barrier. Barrier shall not be used to retain earth.
- VI. See "SOUNDWALL MASONRY BLOCK MISCELLANEOUS DETAILS" sheet for other details.

- A.For type of block, type of block bond, and joint finish, see other sheets.
- B. When blocks are laid in stacked bond. .When blocks are laid in stacked bond, ladder type, galvanized joint reinforcement shall be provided. A minimum of 2 - 3.76 mm wires continuous at 1219 mm az mm to be used. Locate reinforcement in joints that are at the approximate midpoint between
- C.Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.
- D. For intermediate wall heights (H), or barrier depths ( $H_{\rm e}$ ), that are between the values given, use the tabular information for the next higher (H) or ( $H_{\rm e}$ ).
- E.Class 2 concrete to be used for the barrier.
- F.Masonry strengths are listed in the "SOUNDWALL REINFORCEMENT TABLE".

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## SOUNDWALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (1)

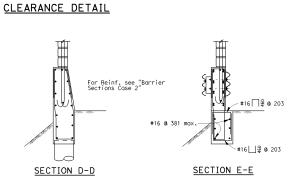
NO SCALE

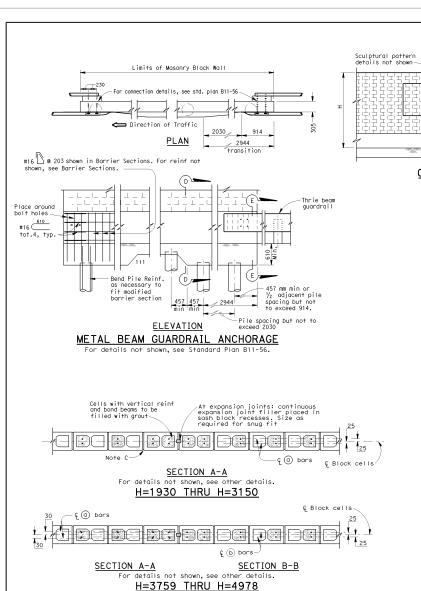
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# DESIGN NOTES

#### DESIGN

Uniform Building Code, 1997 Edition and the Bridge Design Specifications.

# DESIGN WIND LOAD

DESIGN SEISMIC LOAD

#### 1293 Pa

0.01 0000 100

## REINFORCED CONCRETE

f'c = 22.408 MPa fy = 413.688 MPa

#### REGULAR STRENGTH

Bottom of sculptural pattern

- Profile 858

CONCRETE MASONRY

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## SOUNDWALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (2)

NO SCALE

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PLANS APPROVAL DATE

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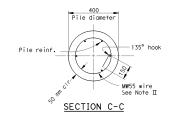
To get to the Caltrans web site, go to: http://www.dot.ca.gi

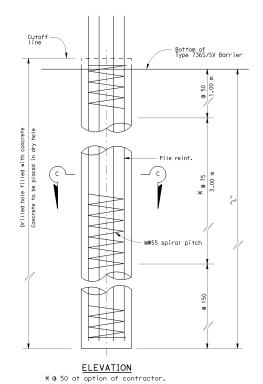
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2004

Std PLAN

B15-8





	CASE 1: PILE DATA												
		0 = 25 r	nin	•	ð = 30 r	nin	Ø = 35 min						
Maximum H	S	L	Pile Reinf.	S	L	Pile Reinf.	S	L	Pile Reinf.	Maximum H			
1930	3000	2200	#19 tot. 6	3000	1900	#19 tot. 6	3000	1600	#19 tot. 6	1930			
2540	3000	2500	#19 tot. 6	3000	2100	#19 tot. 6	3000	1800	#19 tot. 6	2540			
3150	3000	2800	#19 tot. 6	3000	2400	#19 tot. 6	3000	2000	#19 tot. 6	3150			
3759	3000	3100	#22 tot. 6	3000	2600	#22 tot. 7	3000	2200	#22 tot. 6	3759			
4369	3000	3300	#25 tot. 7	3000	2800	#22 tot. 7	3000	2400	#22 tot. 7	4369			
4978	3000	3600	#25 tot. 7	3000	3000	#25 tot. 7	3000	2600	#25 tot. 7	4978			

		CASE 2: PILE DATA										
			Ø = 30 r	nin	(	ð = 35 n	nin					
	Maximum H	S	L	Pile Reinf.	S	L	Pile Reinf.	Maximum H				
	1930	3000	4400	#22 tot. 7	3000	3400	#22 tot. 7	1930				
	2540	3000	4800	#22 tot. 7	3000	3800	#22 tot. 7	2540				
11 - 700	3150	2700	4900	#22 tot. 7	3000	4100	#22 tot. 7	3150				
H <sub>e</sub> = 300	3759	2250	4900	#22 tot. 7	3000	4400	#25 tot. 7	3759				
	4369	1900	4900	#22 tot. 7	2600	4400	#25 tot. 7	4369				
	4978	1650	4900	#22 tot. 7	2400	4500	#25 tot. 7	4978				
	1930	2850	4900	#22 tot. 7	3000	3900	#22 tot. 7	1930				
	2540	2400	4900	#22 tot. 7	3000	4200	#22 tot. 7	2540				
	3150	2050	4900	#22 tot. 7	3000	4500	#25 tot. 7	3150				
H <sub>e</sub> = 600	3759	1800	4900	#22 tot. 7	2750	4600	#25 tot. 7	3759				
	4369	1550	4900	#22 tot. 7	2350	4600	#25 tot. 7	4369				
	4978	1350	4900	#22 tot. 7	2100	4600	#25 tot. 7	4978				
	1930	2050	4900	#22 tot. 7	3000	4400	#25 tot. 7	1930				
	2540	1800	4900	#22 tot. 7	2800	4500	#25 tot. 7	2540				
H <sub>e</sub> = 900	3150	1600	4900	#22 tot. 7	2500	4600	#25 tot. 7	3150				
ne - 900	3759	1400	4900	#22 tot. 7	2250	4600	#25 tot. 7	3759				
	4369	1250	4900	#22 tot. 7	2000	4600	#25 tot. 7	4369				
	4978	1100	4900	#22 tot. 7	1800	4700	#25 tot. 7	4978				
	1930	1500	4900	#22 tot. 7	2250	4400	#25 tot. 7	1930				
	2540	1350	4900	#22 tot. 7	2100	4500	#25 tot. 7	2540				
H <sub>e</sub> = 1200	3150	1200	4900	#22 tot. 7	1900	4500	#25 tot. 7	3150				
"e - 1200	3759	1050	4900	#22 tot. 7	1750	4500	#25 tot. 7	3759				
	4369	950	4900	#22 tot. 7	1600	4600	#25 tot. 7	4369				
	4978	900	4900	#22 tot. 7	1450	4600	#25 tot. 7	4978				

#### <u>NOTES</u>

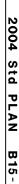
- I. For details not shown, see "SOUNDWALL MASONRY BLOCK ON TYPE 736S/736SV BARRIER - DETAILS (1) and DETAILS (2)" sheets.
- II. Lapped splices in spiral reinforcement shall be lapped at least 80 wire diameters. Spiral reinforcement at splices and at ends shall be terminated with a 135° hook with a 150 mm tail hooked around a longitudinal bar.

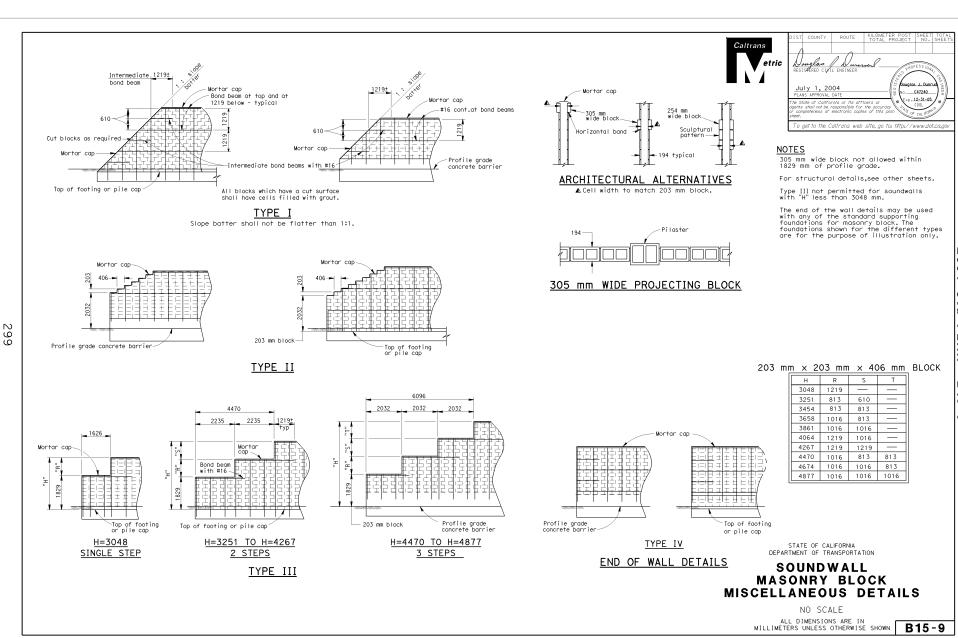
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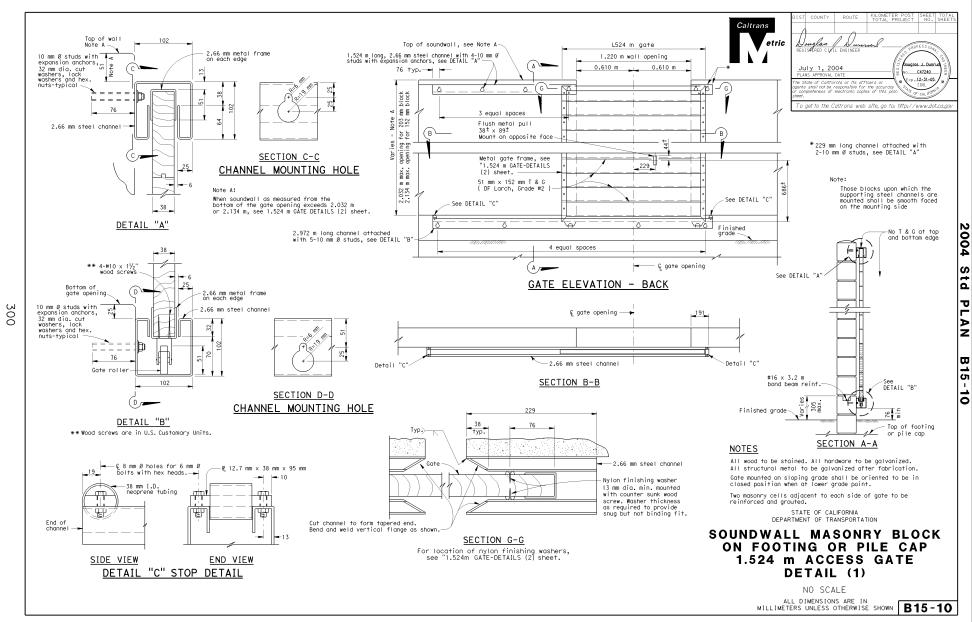
## SOUNDWALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (3)

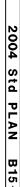
NO SCALE

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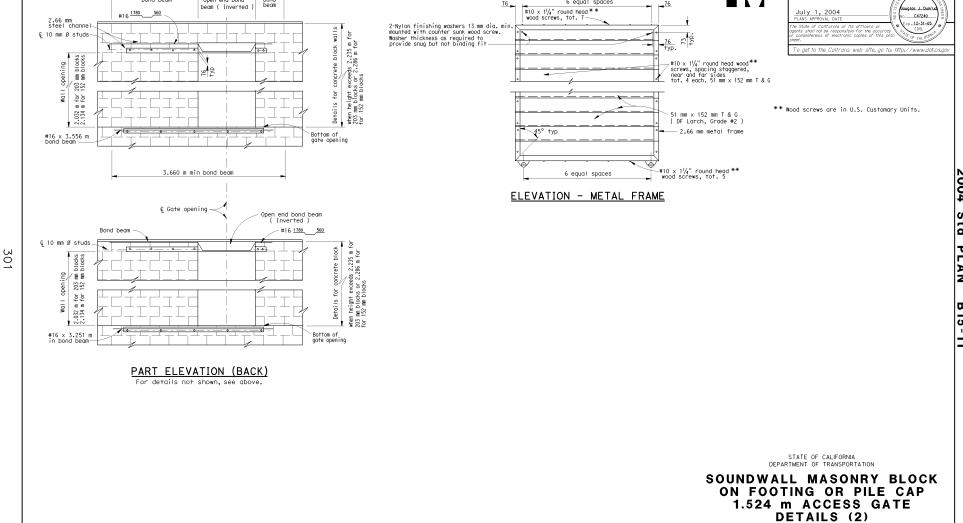


B15-11

NO SCALE

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ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN B15-11



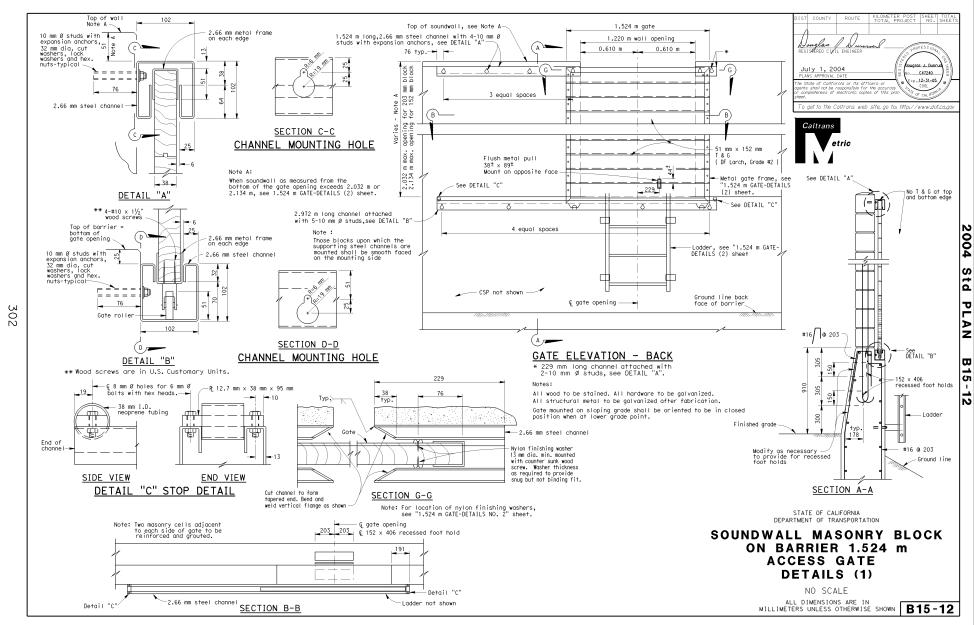
6 equal spaces

1830 min

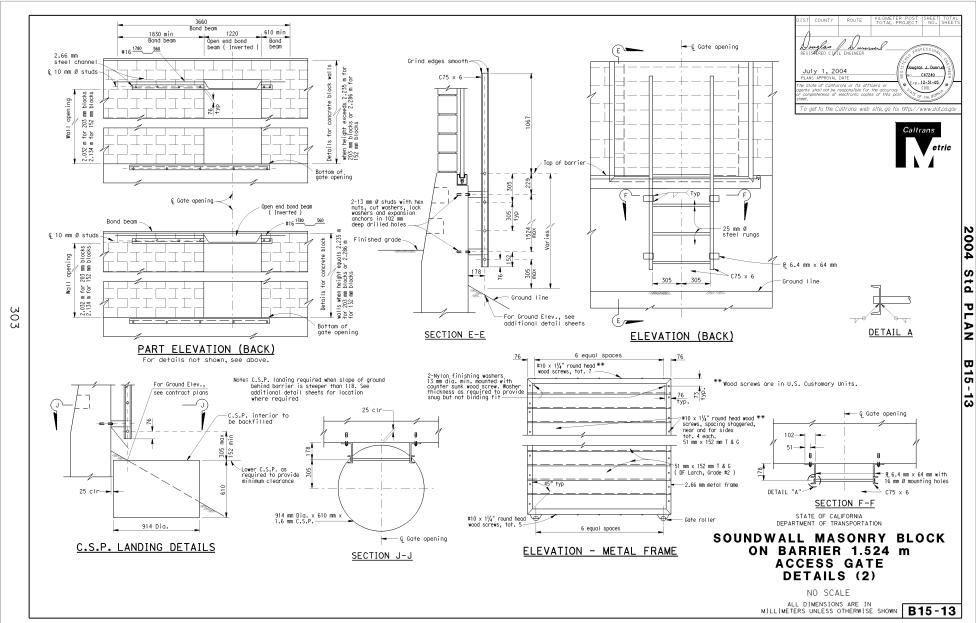
Bond beam

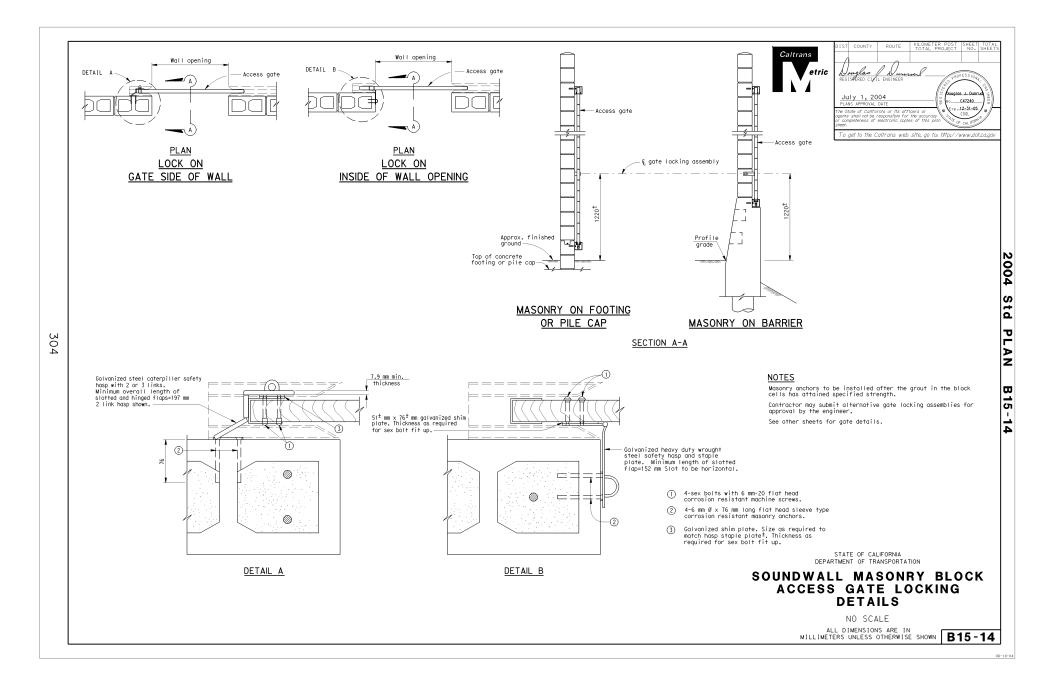
1220

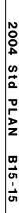
Open end bond

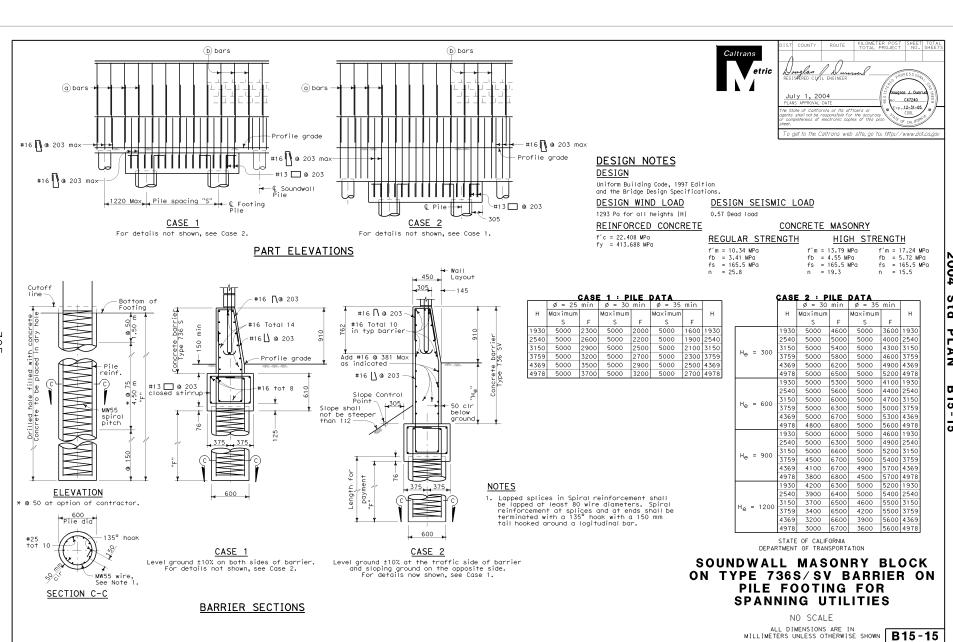


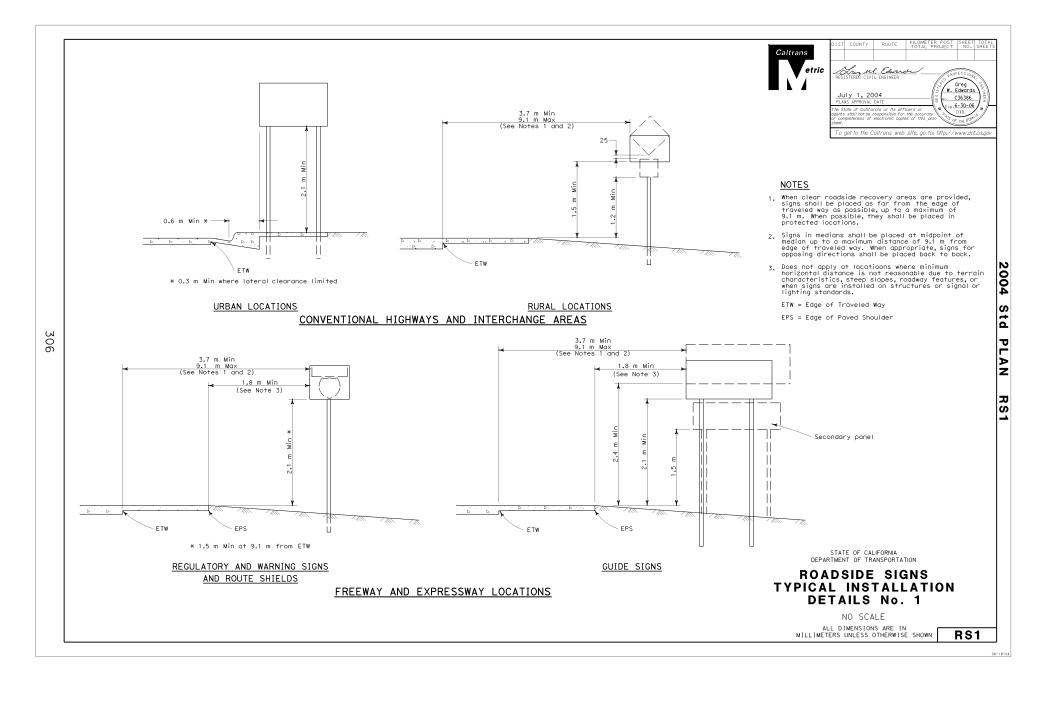
06-10-0

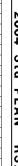




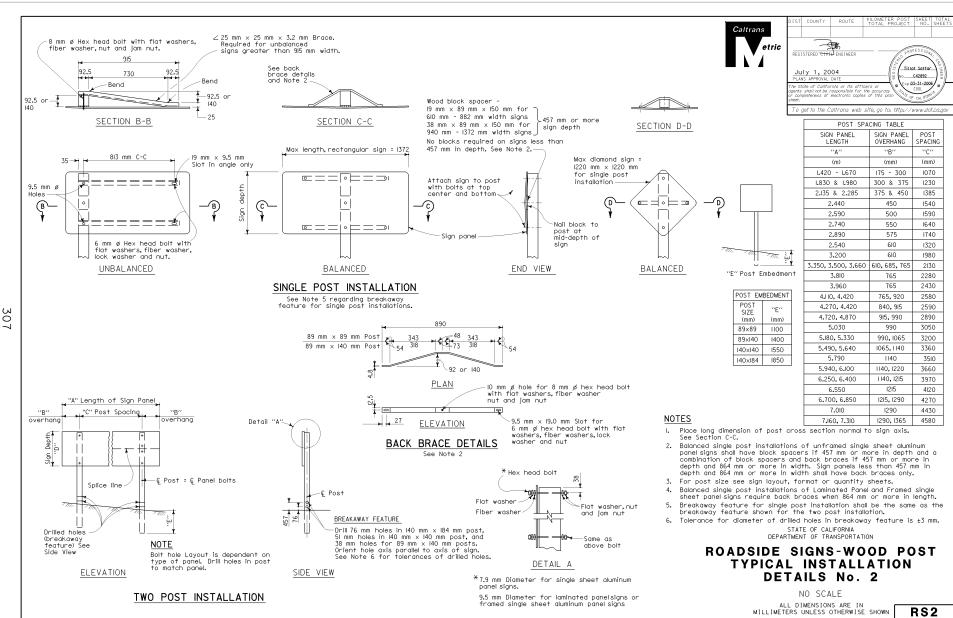






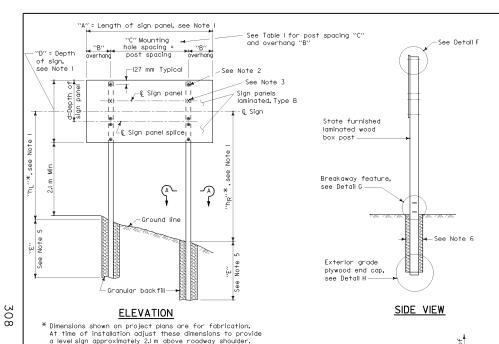








lω



0.88 mm Thick galv

metal cap

- Galy nails

-75 mm Typical

Saw out near and far side

DETAIL F

DETAIL G

Flat metal washer

Sign panel

12.5 mm φ Lag screw

Max diameter of holes is 25 mm-

SIGN PANEL LENGTH (m) (See Note I)	SIGN PANEL OVERHANG (mm)	MOUNTING HOLE SPACING (m)
``A''	"B"	,,C,,
2.44	457	I <b>.</b> 52
2.74	559	1.63
3.05	610	1.83
3.35	610	2.13
3.66	762	2.13
3.96	762	2.44
4.27	762	2.74
4.57	914	2.74
4.88	991	2.90
5.18	991	3.20
5.49	1067	3.35
5.79	1143	3.51
6.10	1219	3.66
6.40	1295	3.81
6.71	1295	4.11
7.01	1372	4.27
7.32	1448	4.42
	T A D I C I	

#### TABLE I

"hı"	TOTAL SIGN AREA (m2)					
or		8.4+	13.0+			
``h <sub>R</sub> ''	†o	to	†o	10	†o	
(m)	8.4	13.0	17.6	22.3	26.9	
2.7 to 4.0	1.8	2.0	2.3	2.6	2.7	
4.0+ to 5.2	1.8	2.1	2.4	2.7	3.0	
5.2+ to 6.4	1.8	2.3	2.7	2.7		
6.4+ to 7.9	2.1	2.4	2.7			

#### TABLE 2

Minimum post embedment "E" for Type L post



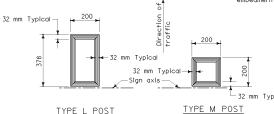
	DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL
c			<del>la</del> r.		_	
U	REGI	STERED CIVI	ENGINEER		ESSIONA	
					_	181
		I <b>ly 1, 20</b> NS APPROVAL		₩ No	t Sattar C42892 3-31-2006	1 × 1 × 1
	agents	shall not be i	rnia or its offi responsible for electronic copie	the accuracy		\\ \*\
	sheet.	prorozoo o	ordon orno dopre	o or mo sion	CALIFO	
	To	get to the C	altrans web	site, go to: http://v	vww.dot	.ca.gov

#### NOTES

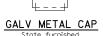
- I. See Project Plans for: Location of each sign. Length of sign panel "A". Depth of sign "D". Height "h" and "h" of centerline of sign above ground line at each post. Type of post, L and M. See Standard Plans RSI for other details.
- 2. "e" indicates location of I2.5 mm lag screws and existing holes in panels. Lag screws are to be embedded at least 25 mm into post using 8 mm diameter pilot holes.
- 3. "x" indicates location of additional 12.5 mm lag screws required when the depth of sign panel (d) and the length of sign panel (A)

d	A
1524 mm	5.18 to 7.32 m
1372 mm	5.78 to 7.32 r
1219 mm	6.40 to 7.32 i
1067 mm	7.32 m

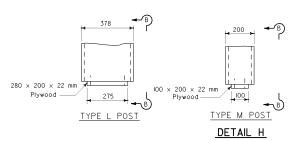
- 4. Type B laminated sign panels are 29 mm thick for sign lengths of 4.6 m and less. Panel over 4.6 m in length are 67 mm thick.
- 5. Embedment "E" for Type L post shall conform to the requirements in Table 2. Embedment for Type M posts shall be
- 6. Diameter of post holes for Type L posts shall be at least 750 mm.
  Diameter of post holes for Type M posts shall be at least 600 mm.

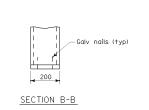






#### SECTION A-A





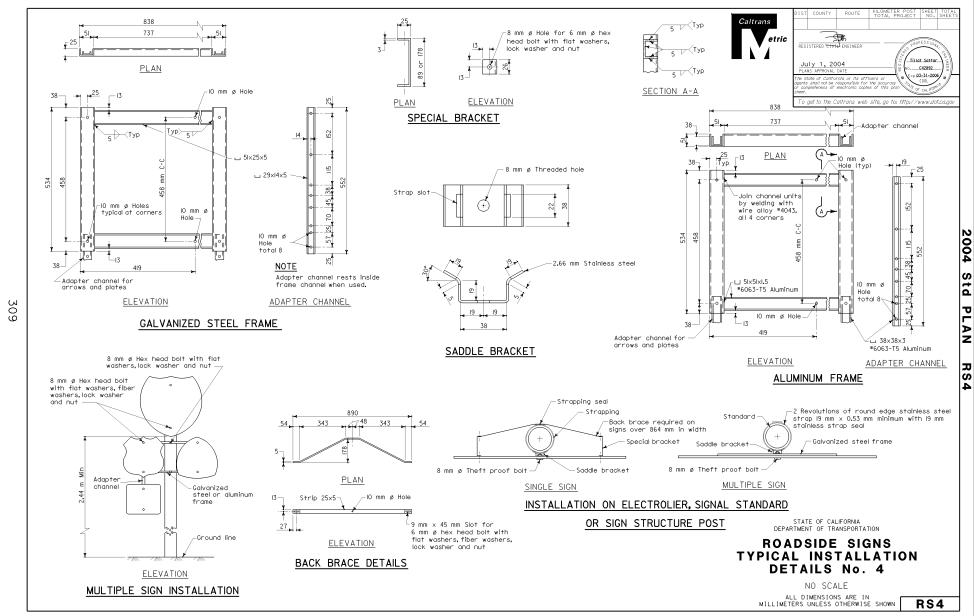
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### **ROADSIDE SIGNS** LAMINATED WOOD BOX POST TYPICAL INSTALLATION **DETAILS No. 3**

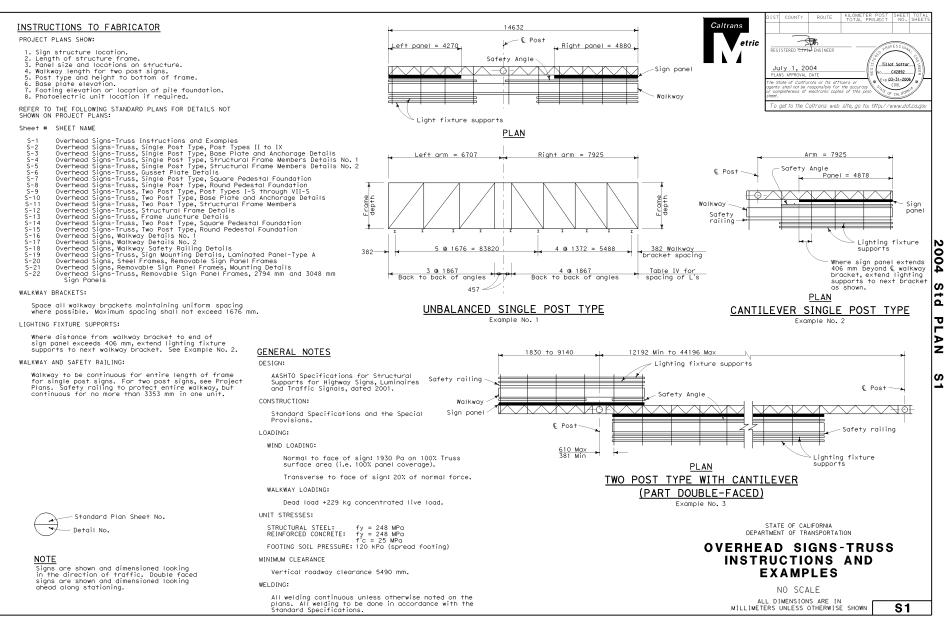
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

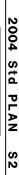
RS3

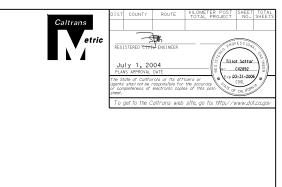






07-29-0





Alternate

Width

3658 x 4267 x 762 14-#19 14-#22 13-#29 13-#29 #16 @ 305

3658 x 4267 x 762 | 15-#19 | 15-#22 | 13-#29 | 13-#29 | #16 @ 305

3658 x 4267 x 762 15-#19 15-#22 13-#29 13-#29 #16 @ 305

3962 x 4267 x 762 15-#19 15-#22 14-#29 14-#29 #16 @ 305

3962 x 4877 x 762 17-#22 17-#22 14-#29 14-#36 #16 @ 305

1524 7.0 3962 x 5182 x 762 18-#22 18-#22 14-#29 14-#36 #16 @ 305

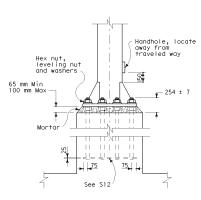
1524 7.6 3962 x 5486 x 762 19-#22 19-#22 14-#29 14-#36 #16 @ 305

89 | 1524 | 7.6 | 3962 × 5486 × 762 | 19-#22 | 19-#22 | 14-#29 | 14-#36 | #16 @ 305

Spread Footing Reinforcement

Top Bottom Top Bottom

Longitudinal



#### ANCHORAGE DETAILS

#### TABLE XV

Square Pedestal

Vertical J-Bars

32

36

16 36 381

Equally spaced total Size

16 32 346

16

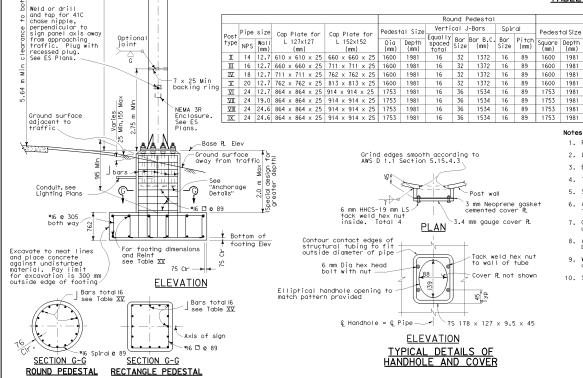
16

16

16 36 381

16 36 381 16 89

16 32 346 16 89



Weld coupling or drill and tap for 21C short nipple, same side as sign face. Plug with recessed pipe plug. See ES Plans.

## 1981

1981

1981

1981

1. For "General Notes" see Standard Plan S1.

Bar Spacing ea face (mm) Size (mm)

346

346

381

16 89

16 89

16 89

16 89

16

16 89

- 2. Longer sides of pedestals and footing shall be normal to axis of sign.
- 3. Backfill shall be in place prior to erection of post
- 4. Thread upper 254 mm of anchor bolts and galvanize upper 305 mm.

Hoop

- 5. Spread footing shown, use Pile Foundation when shown on the Project Plans.
- Anchor plates may be retained with hexagon nut or formed head as alternatives to details shown.

footing

Dia Depth

(mm) (mm)

1372 4.5

372 4.9

1372 5.5

1372 5.8

1524 6.7

Spread Footing See note 2 (mm)

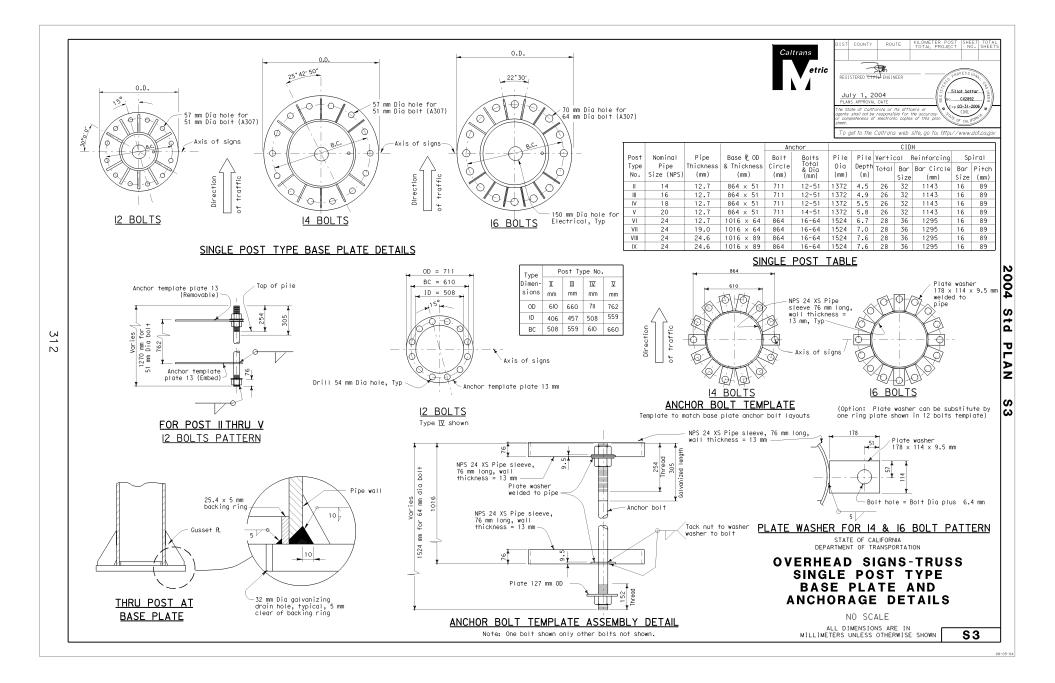
- 7. On single post sign structures, the post shall be raked out of plumb, with the use of the leveling nuts to make the bottom of the sign frame level.
- 8. At final position of post all top and bottom nuts shall be tightened against
- When foundation is location on a steep slope with exposed face of concrete adjacent ot traffic, see "Detail C" on Standard Plan S7.
- 10. Slope protection required when indicated on the Project Plans.

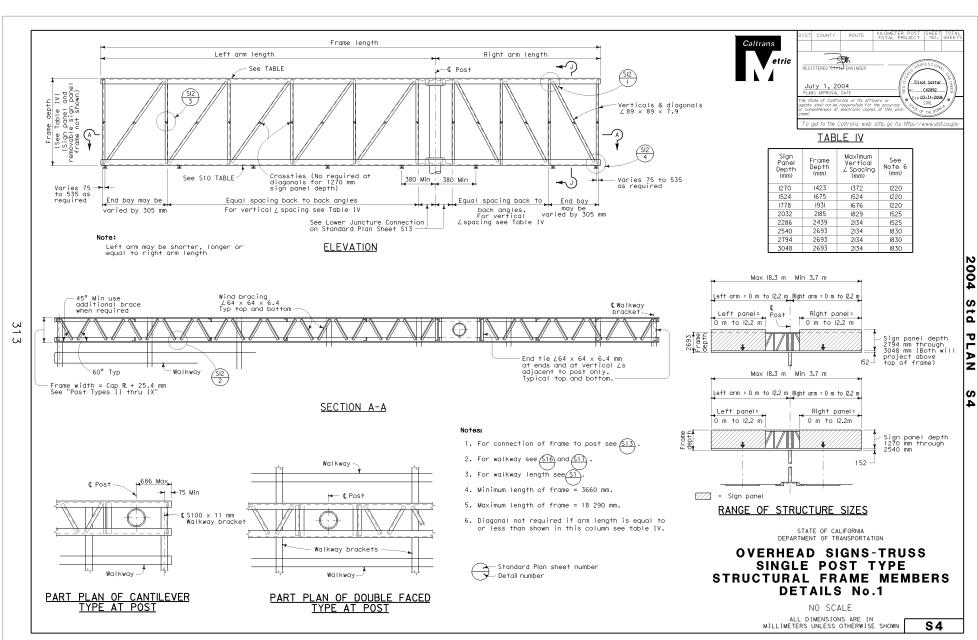
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#### **OVERHEAD SIGNS-TRUSS** SINGLE POST TYPE POST TYPES II THROUGH IX

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN





Span		1524 mm Sign Panel Depth					
L <sub>1</sub> + L <sub>2</sub> (m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing	
3.66	1.68 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
4.0 to 6.1	1.68 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
6.4 to 9.1	1.68 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
9.4 to 12,2	1.68 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
12.4 to 15.2	1.68 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
15.5 to 18.3	1.68 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	

	DIST	COUNTY	ROUTE		R POST ROJECT	SHEET NO.	TOTA SHEE
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etric	Ju	ISTERED CIVE	004		Tillo	t Sattar C42892	LHO INEER
	agents	shall not be i	rnia or its affi respansible for electronic copie	the accuracy	120		
	Tog	get to the C	altrans web	site, go to:	http://v	ww.doi	t.ca.goi

Span		1778 mm Sign Panel Depth						
L <sub>1</sub> + L <sub>2</sub> (m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing		
3.66	1.93 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
4.0 to 6.1	1.93 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
6.4 to 9.1	1.93 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
9.4 to 12,2	1.93 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
12.4 to 15.2	1.93 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
15.5 to 18.3	1.93 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		

Span			2032 mm	Sign Panel [	)epth	
L <sub>1</sub> + L <sub>2</sub> (m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing
3.66	2.18 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4
4.0 to 6.1	2.18 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4
6.4 to 9.1	2.18 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4
9.4 to 12,2	2.18 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4
12.4 to 15.2	2.18 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4
15.5 to 18.3	2.18 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4

Span			2286 mm	2286 mm Sign Panel Depth			
(m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing	
3.66	2.44 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
4.0 to 6.1	2.44 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
6.4 to 9.1	2.44 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
9.4 to 12.2	2.44 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
12.4 to 15.2	2.44 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
15.5 to 18.3	2.44 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	

Span			2540 mm	Sign Panel Depth			
L <sub>1</sub> + L <sub>2</sub> (m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing	
3.66	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
4.0 to 6.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
6.4 to 9.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
9.4 to 12,2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
12.4 to 15.2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
15.5 to 18.3	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	

Span		2794 mm Sign Panel Depth						
L <sub>1</sub> + L <sub>2</sub> (m)	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing		
3.66	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
4.0 to 6.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
6.4 to 9.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
9.4 to 12.2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
12.4 to 15.2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		
15.5 to 18.3	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4		

Span			3048 mm Sign Panel Depth				
L <sub>1</sub> + L <sub>2</sub>	Frame Depth	Frame Width	Chord L	Vertical L	Diagonal L	Top & Bottom Wind Bracing	
3.66	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
4.0 to 6.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
6.4 to 9.1	2.70 m	See Note	L127×127×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
9.4 to 12,2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
12.4 to 15.2	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	
15.5 to 18.3	2.70 m	See Note	L152×152×12.7	L89×89×7.9	L89×89×7.9	L64×64×6.4	

#### Notes:

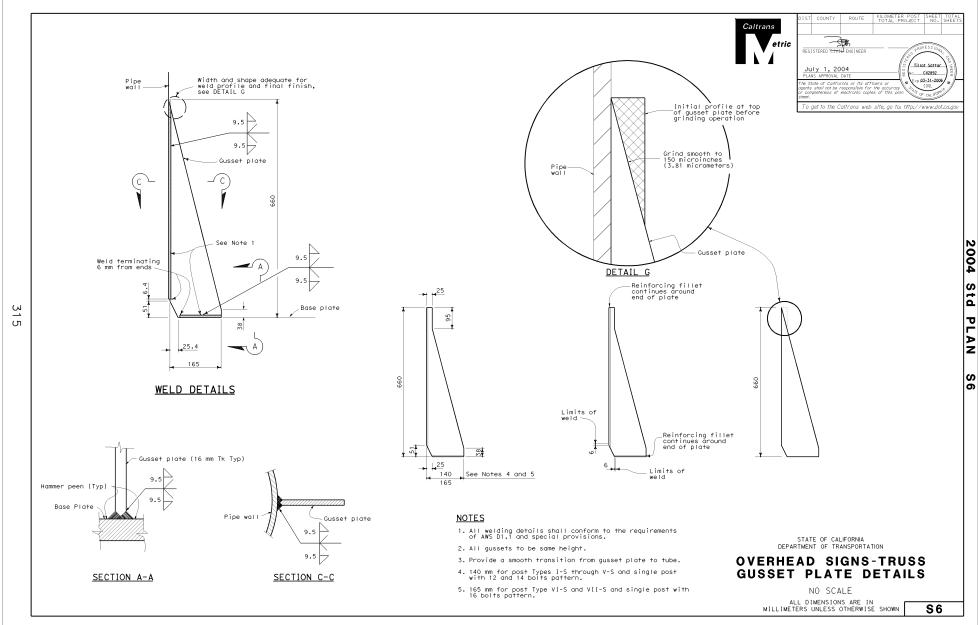
- 1. Frame width = Pipe Dia plus 2  $\times$  shorter L leg plus 25.4 mm.
- 2. Frame length  $L_1 = Left$  arm length
- 3. Frame length L2 = right arm length

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# OVERHEAD SIGNS-TRUSS SINGLE POST TYPE STRUCTURAL FRAME MEMBERS DETAILS No.2

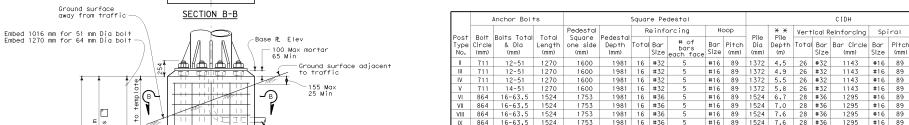
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN









\* \* Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

#### NOTES

- 1. For anchor bolt layout see post sheet.
- 2. For "Base & elevation" see Project Plans.
- 3. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
- Pedestal shall be formed 150 mm minimum below ground surface Remainder to be placed against undisturbed material.
- 5. Slope protection required when indicated on the Project Plans.
- Foundation design is based on 2001 ASSHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used 30 degree and unit weight of soil used is 1922 kg/m<sup>3</sup>.

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# OVERHEAD SIGNS-TRUSS SINGLE POST TYPE SQUARE PEDESTAL FOUNDATION

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S7** 

1524 IX 864 16-63.5 1753 Conduit, see Lighting Plan See "Anchorage Details" on Std Plan S2 ± 13\_ #16 @ 89 mm P: -<u>а</u> Pedestal vertical reinforcement, See table for size payment Place concrete against undisturbed material -76 Mir Ē Pile φ Permissible Const joint Vert Reinf Ground surface away from traffic-Pile diameter 75 Cir -Slope protection See note 6 \ See table Ground surface adjacent to traffic Vertical reinforcement 75 CIr - 25 equally spaced (See table) Spiral Reinf 155 Max 25 Min SECTION A-A DETAIL C

Pedestal Vert Reinf Total 16, see table for size

Spiral reinforcement

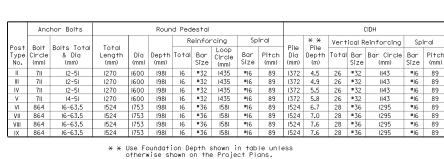
- Axis of sign

#16 🖺 @ 89 mm -

Vertical reinforcement

0





#### <u>NOTES</u>

- 1. For anchor bolt layout see post sheet.
- 2. For "Base R elevation" see Project Plans.

Caltrans

- Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
- 4. Pedestal shall be formed 150 mm minimum below ground surface Remainder to be placed against undisturbed matérial.
- 5. Slope protection required when indicated on the Project Plans.
- Foundation design is based on 2001 ASSHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used 30 degree and unit weight of soil used is 1922 kg/m<sup>3</sup>.

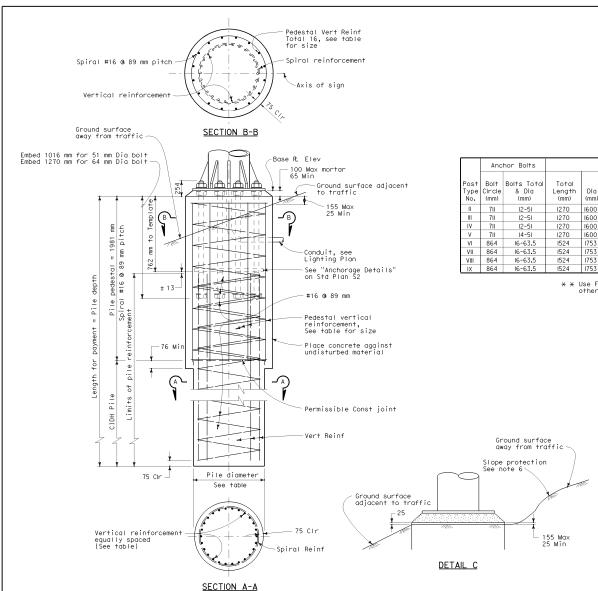
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#### **OVERHEAD SIGNS-TRUSS** SINGLE POST TYPE **ROUND PEDESTAL FOUNDATION**

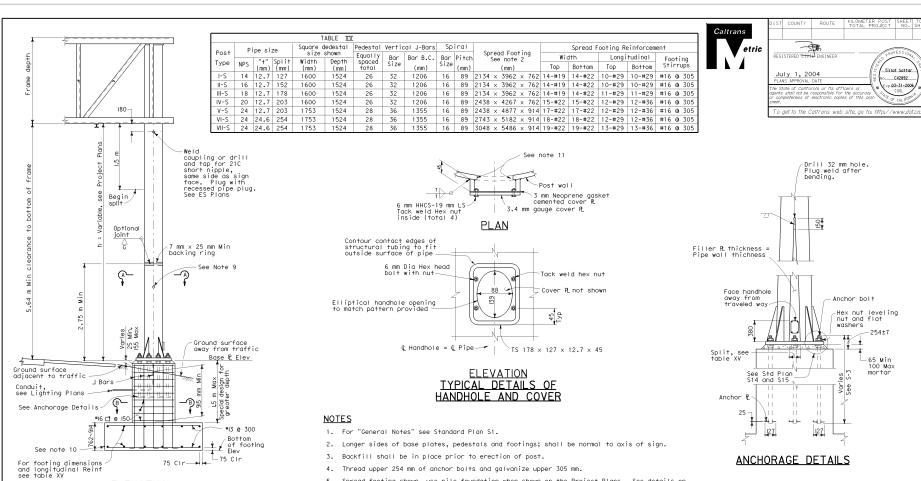
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S8** 



 $\neg$ 



- 3. Backfill shall be in place prior to erection of post.
- 4. Thread upper 254 mm of anchor bolts and galvanize upper 305 mm.
- Spread footing shown, use pile foundation when shown on the Project Plans. See details on Standard Plans S14 and S15.
- 6. Anchor plates may be retained with hex nut or formed head as an alternative to details shown.
- 7. When foundation is located on a steep slope with exposed face of concrete adjacent to traffic, see "Detail C" on Standard Plan S14 and S15.
- 8. Slope protection required when indicated on Project Plans.
- Weld coupling or drill and tap for 41C chase nipple, perpendicular to sign panel axis away from approaching traffic. Plug with recessed pipe plug. See Standard Plan ES-15C.
- 10. Excavate to neat lines and place concrete against undisturbed material.
- 11. Grind edges smooth according to AWS D1.1 Section 5.15.4.3.

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**OVERHEAD SIGNS-TRUSS** TWO POST TYPE POST TYPES I-S THROUGH VII-S

NO SCALE

**S9** 

Back welds with 7 mm #16 [] @ 150 Axis of strip FAM. Vertical straight bars total 14, see Std Plan S14. sign Axis of Square pedestal shown, for round pedestal see Std Plan S15 Тур -1.5 mm Max "build up" SECTION A-A SECTION B-B

Vertical J-Bars, see table XV

**ELEVATION** 

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ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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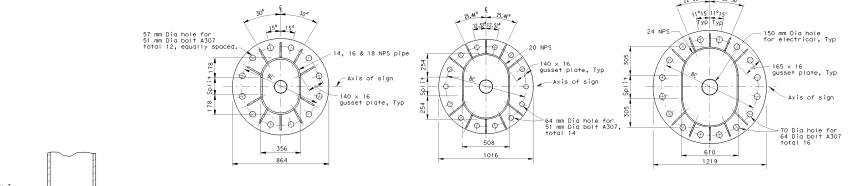
						Anchor	
Post Type	Nominal Pipe Size (NPS)	Pipe Wall Thickness (mm)	Pipe split (mm)	Base PLOD & Thickness (mm)	Bolt Circle (mm)	Bolts total & Dia (mm)	Length (mm)
I-S	14	12.7	127	864 × 51	711	12-51	1270
II-S	16	12.7	152	864 × 5I	711	12-51	1270
III-S	18	12.7	178	940 × 5I	787	12-51	1270
IV-S	20	12.7	203	1016 × 51	864	14-51	1270
V-S	24	12.7	203	III8 X 5I	965	16-64	1524
VI-S	24	24.6	254	1219 × 64	1041	16-64	1524
VII-S	24	24.6	254	1219 × 64	1041	16-64	1524

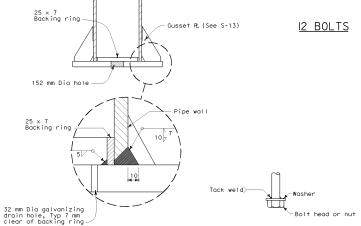
#### TWO POST TABLE

THRU POST AT

BASE PLATE

3





ANCHORAGE DETAIL

14 BOLTS TWO POST TYPE BASE PLATE DETAILS

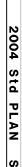
STATE OF CALIFORNIA
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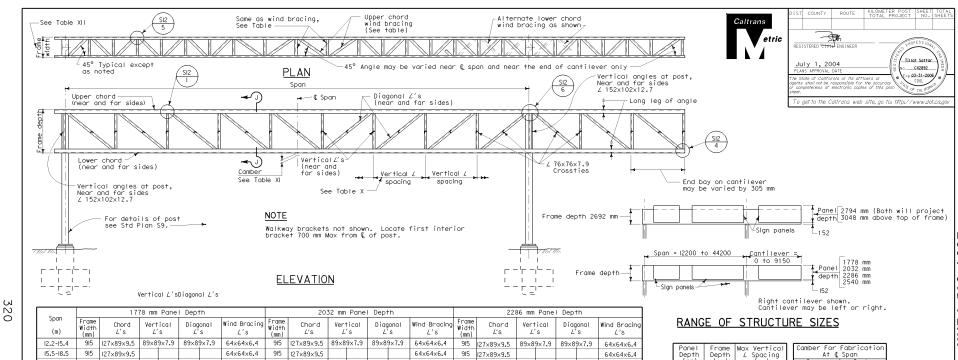
I6 BOLTS

#### **OVERHEAD SIGNS-TRUSS** TWO POST TYPE BASE PLATE AND ANCHORAGE DETAILS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN





			177	78 mm	Pane	I Dep			2032 mm Panel Depth								2286 mm Panel Depth						
	Span (m)	Frame Width (mm)	Chord L's		ical 's	Diag L'	iona I s	Wind Bracing L's	Frame Chord (mm) L's		Vertical L's		Diagonal L's		Wind Bracing , L's		Chord <i>L</i> 's	Vertical L's		Diagonal L's		Wind Bracing L's	
	12.2-15.4	915	127×89×9.5	89×8	9×7.9	89×8	9×7.9	64×64×6.4	915	127×89×9.5	89×89×7.9		89×89×7.9		64×64×6.4	915	127×89×9.5	89×89×7.9		9 89×89×7		64×64×6.4	
Г	15.5-18.5	915	127×89×9.5					64×64×6.4	915	127×89×9.5					64×64×6.4	915	127×89×9.5					64×64×6.4	
Г	18.6-21.5	915	127×89×9.5					64×64×6.4	915	127×89×9.5					64×64×6.4	915	127×89×9.5					64×64×6.4	
Г	21.6-24.6	915	I52×I02×I2.7					64×64×6.4	915	152×102×12.7					64×64×6.4	915	152×102×12.7					64×64×6.4	
Г	24.7-27.6	915	152×102×12.7					64×64×6.4	915	152×102×12.7					64×64×6.4	915	152×102×12.7					64×64×6.4	
Г	27.7-30.7	915	I52×I02×I2.7					64×64×6.4	915	152×102×12.7					64×64×6.4	915	I52×I02×I2.7					64×64×6.4	
Г	30.8-33.7	915	203×102×19.0					64×64×6.4	915	203×102×19.0					64×64×6.4	915	203×102×19.0					76×76×9.5	
Г	33.8-36.8	915	203×102×19.0					64×64×6.4	915	203×102×19.0					64×64×6.4	915	203×102×19.0					76×76×9.5	
	36.9-39.8	915	203×102×19.0					64×64×6.4	915	203×102×19.0					64×64×6.4	1067	203×102×19.0					76×76×9.5	
Г	39.9-44.2	915	203×102×19.0					64×64×6.4	915	203×102×19.0	١,		,	,	64×64×6.4	1067	203×102×19.0		,	,	,	76×76×9.5	

Frame

(mm)

915

915

915

915

1067

1067

Chord

L's

127×89×9.5

127×89×9.5

127×89×9.5

152×102×12.7

203×102×19.0

203×102×19.0

9I5 | I52×I02×I2.7

1067 ||52x||02x||2,7

1067 203×102×19.0

1067 229×102×19.0

Span

(m)

12.2-15.4

15.5-18.5

18.6-21.5

21.6-24.6

24.7-27.6

27.7-30.7

30.8-33.7

33.8-36.8

36.9-39.8

39.9-44.2

2794 mm and 3048 mm Panel Depth

Diagonal

89×89×7.9

Wind Bracing

L's

64×64×6.4

64×64×6.4

64×64×6.4

76×76×9.5

76×76×9.5

76×76×9.5

76×76×9.5

76×76×9.5

76×76×9.5

76×76×9.5

Vertical

89×89×7.9

Pane I Depth	Frame Depth	Max Vertical L Spacing	Camber For Fabrication At ( Span
(mm)	(mm)	(mm)	Span Camber (mm)
1778	1931	1829	12.19 - 15.24 27
2032	2185	1829	15.25 - 30.48 54
2286	2439	2286	30.49 - 44.20 83
2540	2693	2286	
2794	2693	2286	Camber to approximate po

Camber to approximate parabola. Camber of cantilever arm = +13 mm for arms greater than 3050 mm

TABLE X

3048 2693

TABLE XI

#### NOTE

Frame widths shown are nominal. These widths may be varied by 6.4 mm to standardize fabrication methods.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Standard Plan Sheet No.

#### OVERHEAD SIGNS-TRUSS TWO POST TYPE STRUCTURAL FRAME MEMBERS

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

S11

TABLE XII

Wind Bracing

L's

64×64×6.4

64×64×6.4

64×64×6.4

64×64×6.4

64×64×6.4

64×64×6.4

76×76×9.5

76×76×9.5

76×76×9.5

76×76×9.5

2540 mm Panel Depth

Diagonal

89×89×7.9

Vertical

89×89×7.9

Span

(m)

12.2-15.4

15.5-18.5

18.6-21.5

21.6-24.6

24.7-27.6

27.7-30.7

30.8-33.7

33.8-36.8

36.9-39.8

39.9-44.2

Frame

Width

(mm)

915

915

915

Chord

L's

127×89×9.5

127×89×9.5

127×89×9.5

9I5 ||52×102×12.7

9I5 ||52×||02×||2.7

9I5 ||52×102×12.7

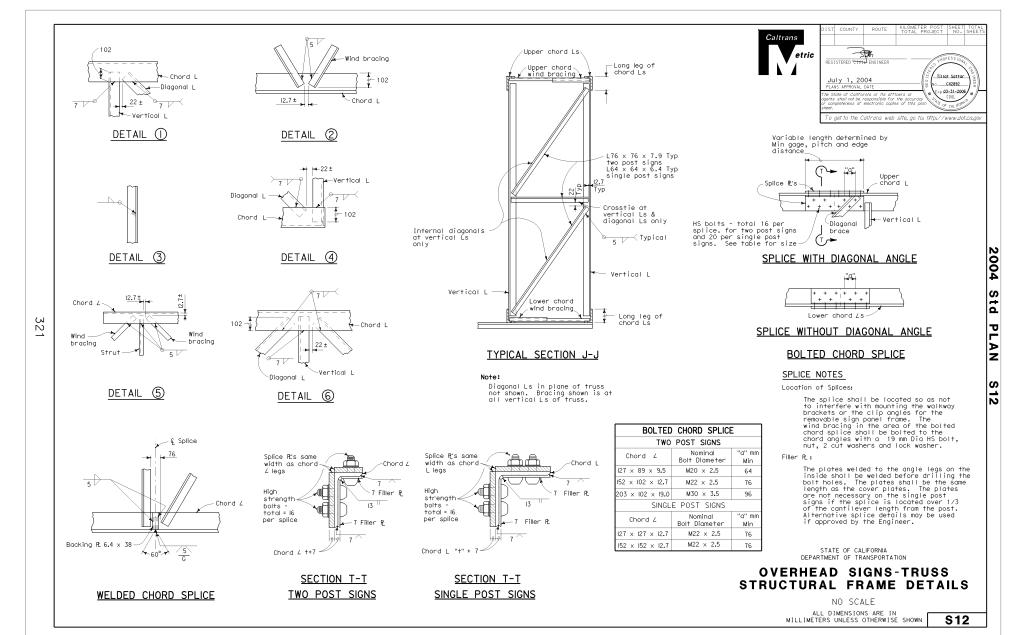
1067 203×102×19.0

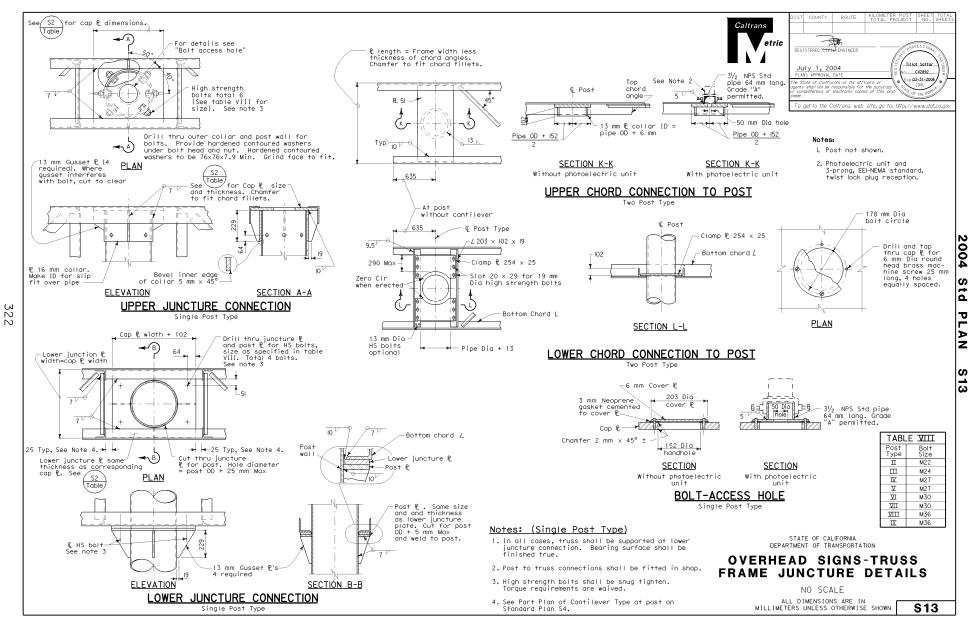
1067 203×102×19.0

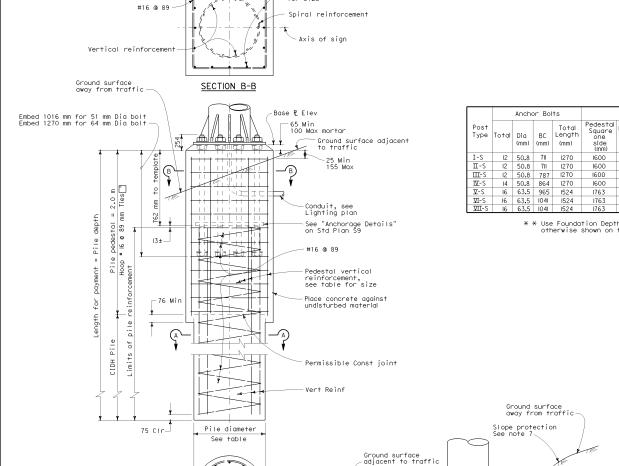
1067 203×102×19.0

1067 203×102×19.0

07-30-0







75 CIr

Spiral Reinf

SECTION A-A

32

Vertical reinforcement equally spaced (See table)

Pedestal Vert Reinf Total 16, see table



		Anche	or Bol	lts			CIDH Pile											
Post				Total	Pedestal Square	Pedestal	F	einfo	orcing	Но	qc	Pile	Pile	Rei	nford	ing	Spi	îral
	Total	Dia (mm)	BC (mm)	Length (mm)	one side (mm)	Depth (mm)	Total	Bar Size	Spacing each face	Bar Size	Pitch	Dia (mm)	Depth (m)	Total	Bar Size	BC (mm)	Bar Size	Pitch
I-S	12	50.8	711	1270	1600	1981	16	32	346	16	89	1372	5.5	26	32	1143	16	89
II-S	12	50.8	711	1270	1600	1981	16	32	346	16	89	1372	6.0	26	32	1143	16	89
Ⅲ-S	12	50.8	787	1270	1600	1981	16	32	346	16	89	1372	7.0	26	32	1143	16	89
IV-S	14	50.8	864	1270	1600	1981	16	32	346	16	89	1372	7.0	26	32	1143	16	89
<b>⊻</b> -S	16	63.5	965	1524	1763	1981	16	36	381	16	89	1524	8.0	28	36	1295	16	89
<b>VI-</b> S	16	63.5	1041	1524	1763	1981	16	36	381	16	89	1524	8.5	28	36	1295	16	89
VII-S	16	63.5	1041	1524	1763	1981	16	36	381	16	89	1524	8.5	28	36	1295	16	89

\* \* Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

25 Min

DETAIL C

#### **NOTES**

- 1. For anchor bolt layout see post sheet.
- 2. For "Base & elevation" see Project Plans.
- Pedestals and base plates, longer sides shall be normal to axis of sign.
- 4. Prior to erection of the post, backfill which is epuivalent to the surrounding material, shall be in place.
- Pedestal shall be formed 150 mm Min below ground surface. Remainder to be placed against undisturbed material.
- 6. Slope protection required when indicated on the Project Plans.  $\,$
- Foundation design is based on 2001 ASSHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used 30° and unit weight of soil used is 1922 kg/m³.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### **OVERHEAD SIGNS-TRUSS** TWO POST TYPE SQUARE PEDESTAL FOUNDATION

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

COUNTY ROUTE KILOMETER POST TOTAL PROJECT

Tillat Satta

C42892 co 03-31-200

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Caltrans

	// Spiral reinforcement
	[
	\\ % \ / Axis of sign
Vertical reinforcement —	
	75 CIr
	- 75 CII

Pedestal Vert Reinf Total 16, see table for size

#16 @ 89

Vert Reinf

75 Clr

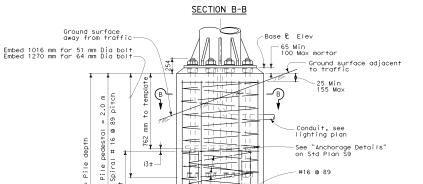
Spiral Reinf

Pedestal vertical reinforcement, see table for size

Place concrete against undisturbed material

Permissible Const joint

Ground surface adjacent to traffic - 25



Pile diameter

See table

SECTION A-A

Spiral #16 @ 89 pitch -

13±-

76 Mir

<u>-</u>

÷ Pile

Ξ.

75 Cir-

Vertical reinforcement equally spaced (See table)

CIDH

<u>-</u>

 $\sim$ 

		Anchor	Bol	ts	Round Pedestal								CIDH Pile							
Post	T - 1 - 1	· ·	D.C.	Total	Dia	0	Re	infor	cing	Но	ор		Pile		nforc	ing	Spi	iral		
* '	Total	(mm)	BC (mm)	Length (mm)	(mm)	Depth (m)	Total	Bar Size	BC (mm)	Bar Size	Pitch	Dia (mm)	Depth (m)		Bar Size	BC (mm)	Bar Size	Pitch		
I-S	12	50.8	711	1270	1600	1981	16	32	1381	16	89	1372	5.5	26	32	1143	16	89		
∐-S	12	50.8	711	1270	1600	1981	16	32	1381	16	89	1372	6	26	32	1143	16	89		
III-S	12	50.8	787	1270	1600	1981	16	32	1381	16	89	1372	7	26	32	1143	16	89		
IV-S	14	50.8	864	1270	1600	1981	16	32	1381	16	89	1372	7	26	32	1143	16	89		
<b>⊻</b> -S	16	63.5	965	1524	1753	1981	16	36	1533	16	89	1524	8	28	36	1295	16	89		
<b>VI</b> −S	16	63.5	1041	1524	1753	1981	16	36	1533	16	89	1524	8.5	28	36	1295	16	89		
VII-S	16	63.5	1041	1524	1753	1981	16	36	1533	16	89	1524	8.5	28	36	1295	16	89		

\* \* Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

Ground surface away from traffic-

155 Max

25 Min

Slope protection See note 7

DETAIL C

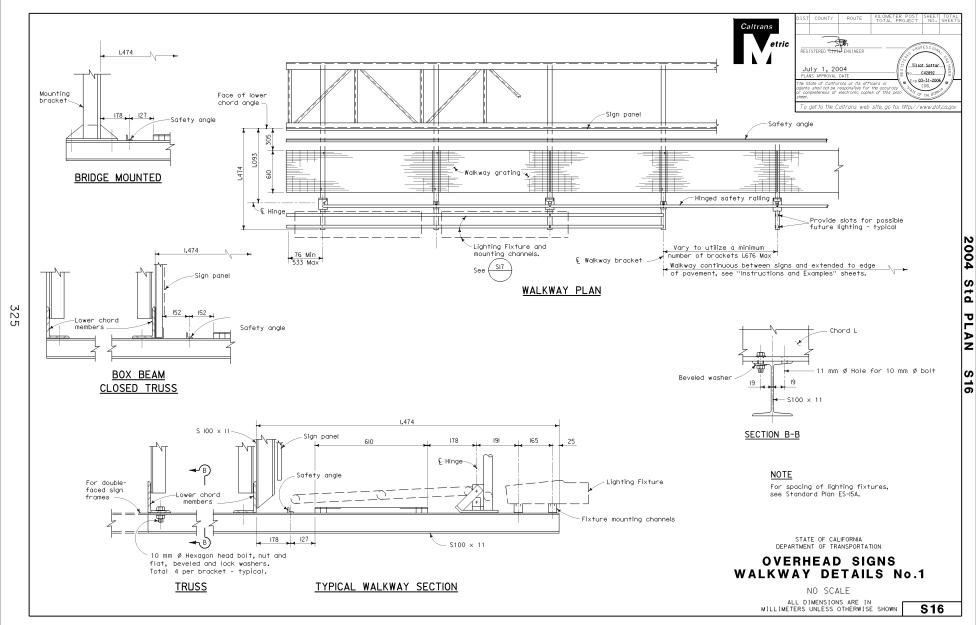
#### **NOTES**

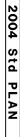
- 1. For anchor bolt layout see post sheet.
- 2. For "Base & elevation" see Project Plans.
- 3. Prior to erection of the post, backfill which is epuivalent to the surrounding material, shall be in place.
- Pedestal shall be formed 150 mm Min below ground surface. Remainder to be placed against undisturbed material.
- 5. Slope protection required when indicated on the Project Plans.
- Foundation design is based on 2001 ASSHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used 30° and unit weight of soil used is 1922 kg/m³.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### **OVERHEAD SIGNS-TRUSS** TWO POST TYPE **ROUND PEDESTAL FOUNDATION**

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### STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **OVERHEAD SIGNS** WALKWAY DETAILS No.2

NO SCALE ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S17** 

ROUTE KILOMETER POST TOTAL PROJECT

o get to the Caltrans web site, go to: http://www.dot.ca.g

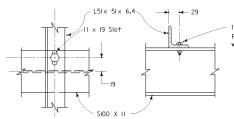
Tillat Satta

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he State of California or its officers or

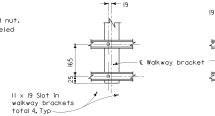
July 1, 2004

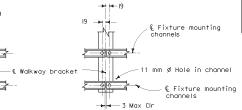


SAFETY ANGLE DETAILS

For bridge mounted signs

10 mm Ø Hex head bolt and nut. Provide flat, lock and beveled



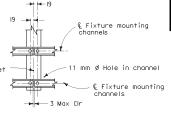


**Ч**— 19 Тур

€ Walkway

bracket

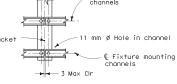
WALKWAY DETAILS

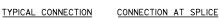


-11 mm Ø Hole for 10 mm Ø bolt, nut, beveled and lock washers

Cross bars at 102 C-C

Caltrans

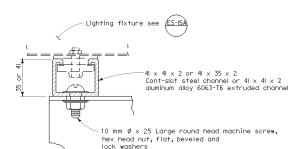




1.52 Saddle anchor

Bearing bar

 $32 \times 3$ 

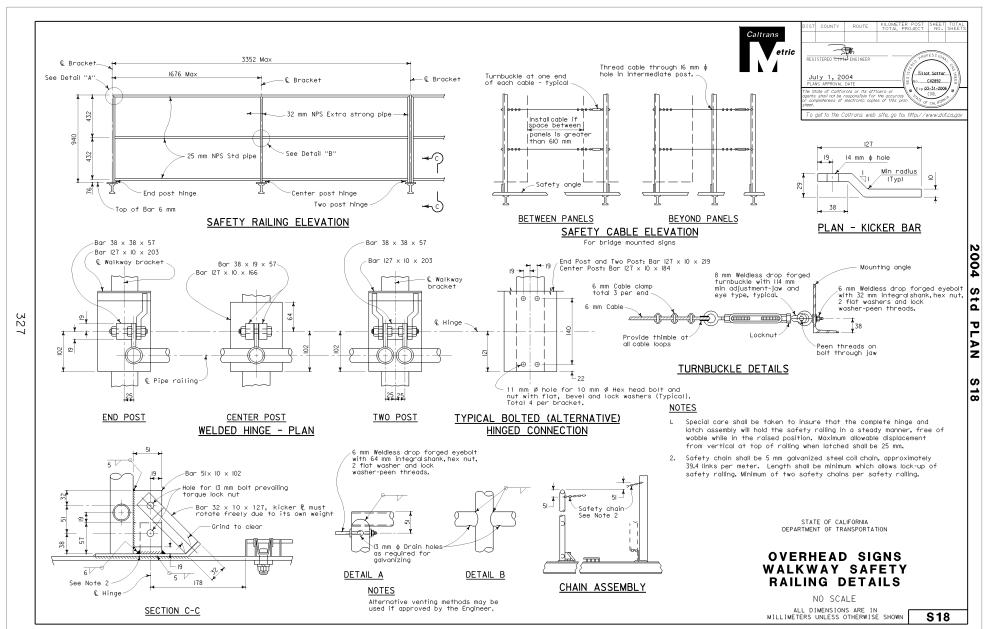


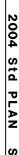
## LIGHTING FIXTURE MOUNTING CHANNEL DETAILS

of handling and assembly.

326

- NOTES I) Welded type grating shall have  $32 \times 3$  bearing bars at 30 mm centers with 6 mm diameter (or equal) cross bars at 102 mm centers. If mechanical lock grating is used, it shall be equal in strength to the welded type. Alternate hold-down clips may be submitted for
- 2) Walkway grating and light fixture mounting channels to be continuous (no splices) over as many walkway brackets as practicable consistent with fabrication, ease







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#### MOUNTING BEAM SPACING TABLE

COUNTY

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SIGN PANEL LENGTH * (m)	NUMBER MOUNTING BEAMS	SIGN PANEL OVERHANG (mm)	MOUNTIN SPAC (m)	(m)
"A"		"B"		"E"
I <b>.</b> 52	2	229	1.02	
1.83	2	305	1.22	
2.13	2	381	1.37	
2.44	2	458	1.52	
2.74	2	559	1.63	
3.05	2	610	1.83	
3.35	2	610	2.13	
3.66	2	762	2.13	
3.96	2	762	2.44	
4.27	2	762	2.74	
4.57	2	915	2.74	
4.88	3	153	2,29	2.29
5.18	3	305	2,29	2.29
5.49	3	305	2.44	2.44
5.79	3	305	2.59	2.59
6.10	3	458	2.59	2.59
6.40	3	458	2.74	2.74
6.71	3	610	2.74	2.74
7.01	3	762	2.74	2.74
7.32	3	915	2.74	2.74

\* Signs longer than 7.32 meters are fabricated and mounted as adjoining single panels. The location of the vertical splice line will be determined by the Engineer.

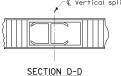
### **NOTES**

-Upper chord angle

Chord angle thickness minus 1.5 mm

**-**−13

- The location of the horizontal splice line is dependent on the sign panel manufacturer for signs greater than 1524 mm in depth.
- 2. Mounting bolts and clamps are required on each side of the horizontal splice lines at each support beam.
- 3. Dimension varies from panel to panel. Average value approximate 32 mm.
- 4. Torque stainless steel sign panel mounting bolts to 12 Nm.
- 5. Chord angle clamp to be galvanized after fabrication.
- 6. The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
- 2750 mm and 3000 mm sign panel along with the mounting beams will
  project above the top chord truss member 254 mm and 508 mm respectively.
  Attachment details shall be the same.



- A-1 Mounting hardware, See Standard Plan S87 and Note 4.

SECTION B-B

115

39 32

> STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

#### **OVERHEAD SIGNS-TRUSS** SIGN MOUNTING DETAILS LAMINATED PANEL-TYPE A

NO SCALE

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Lower chord angle

SECTION A-A

Panel depth

Top of walkway

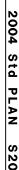
bracket.

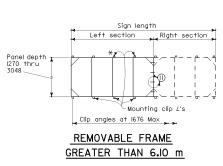
"\A"

Face of

∕© Vertical splice line

14 mm Ø Hole

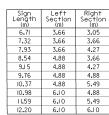




 $\star$  2794 & 3048 sign panel frames will project above the top chord of the truss. In these cases the top clips shall be bolted to vertical frame members. See Standard Plan S22 for details.

32

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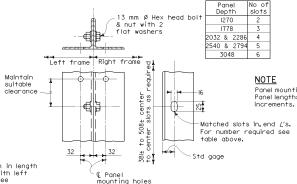


## NOTES

Frames for signs greater than 6.10 m in length shall be fabricated in two sections with left section a multiple of 1220 in length. See table above.

Sections shall be hoisted into place individually and bolted together as per detail (1) prior to tightening of mounting clip bolts.

Bolting two sections together and hoisting simultaneously will not be permitted.



DETAIL

13 Hex head bolt & nut. Provide

# Panel mounting holes not shown. Panel lengths available in 610

NOTES

Caltrans



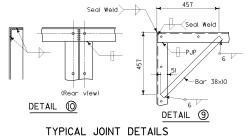
Panel frame length 1220 Sign panel depth - WT 75×9 1270 thru 3048 Bar 38xI0 Frame Z's 76×76×4.8

TYPICAL REMOVABLE FRAME

(1220 thru 6096)

I. Frames shall be all-welded construction.

- 2. Panel mounting holes shall be drilled by template. Sign panel may be considered a template.
- 3. Drilled and tapped holes 6.34 mm may be used where interference due to welds or structural members is encountered.
- 4. WT 75  $\times$  9 shall be flush with faces of frame angles.
- Mounting clip angles shall be located such as to allow the top and bottom frame angles of the removable sign panel to lie on a straight horizontal line.
- Top chord member 6. Holes for mounting removable sign panel frame may be slotted 25 mm maximum parallel to the axis of the sign.
  - 7. WT 75  $\times$  9 may be crimped at ends to join frame angles. Fillet weld all around.

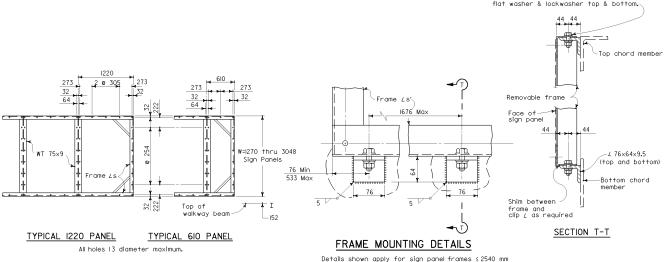


### **OVERHEAD SIGNS** STEEL FRAMES REMOVABLE SIGN PANEL FRAMES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

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**S20** 



deep. Mounting details for deeper panels shown

on Standard Plan S22.

MOUNTING HOLE SPACING SIGN PANEL & FRAME

Hole spacing is for single sheet sign panels. For Overhead Formed Panels refer to "Overhead Formed Panel" Sheet.

NO SCALE



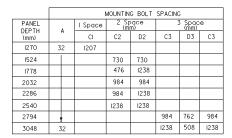


TABLE I

#### **ELEVATION VIEW** NEW OR EXISTING REMOVABLE SIGN PANEL FRAME MOUNTING HOLE SPACING

The Contractor shall verify all dependent dimensions in the field

before ordering or fabricating any material.

Sign panel length

@ 1220 Spacing

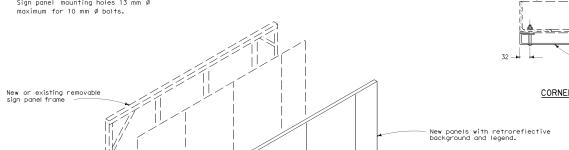
New or existing RSPF —

Sign panel mounting holes 13 mm Ø

If existing sign panel is in place, remove.

NOTE

P- € Bolts-1



Overhead formed panel

610 or 1220 as required.

Right end only.

New or existing removable sign panel frame \_A-3 Mounting Hardware, See Standard Plan S91. Overhead formed panel

CORNER DETAIL

PANEL CONNECTION

SECTION A-A

#### NOTES

When constructing a new frame:

- (I) Refer to Standard Plan Sheet S20 for structural details,
- (2) Sign panels shall be considered as a template for drilling holes for mounting bolts.

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#### **OVERHEAD SIGNS** REMOVABLE SIGN PANEL FRAMES MOUNTING DETAILS

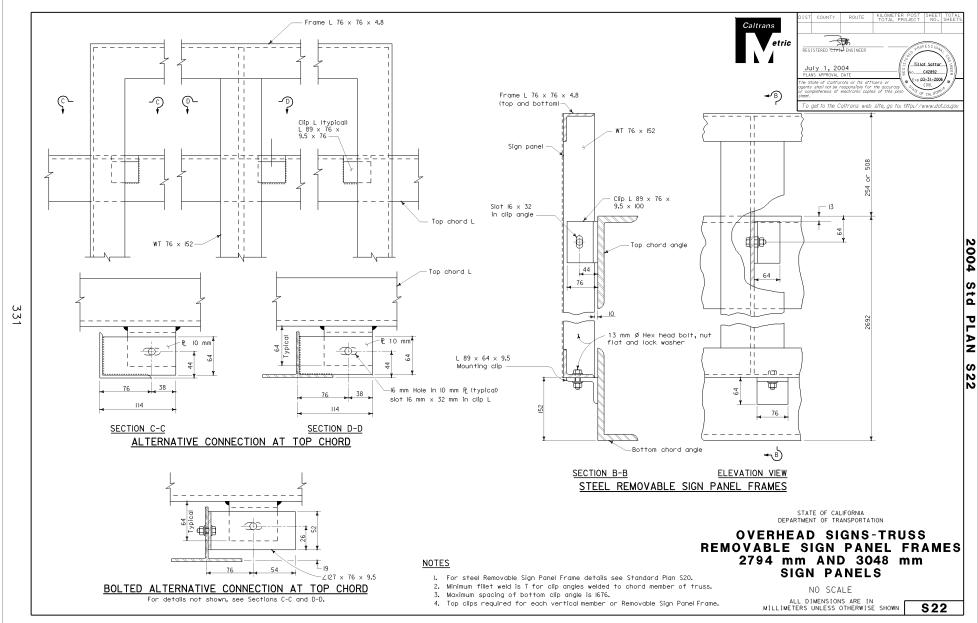
NO SCALE

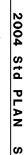
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**S21** 

2004 Std PLAN

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#### **SPECIFICATIONS**

#### DESIGN:

AASHTO Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, dated 2001.

#### CONSTRUCTION:

Standard Specifications and the Special Provisions.

#### LOADING:

#### WIND LOADING:

Normal to face of sign: 1930 Pa on 100% panel coverage.

Transverse to face of sign: 20% of normal force.

#### WALKWAY LOADING:

Dead load +229 kg concentrated live load.

#### UNIT STRESSES:

STRUCTURAL STEEL: fy = 250 MPa REINFORCED CONCRETE: fy = 415 MPa f'c = 28 MPa

FOOTING SOIL PRESSURE: 120 kPa (spread footing)

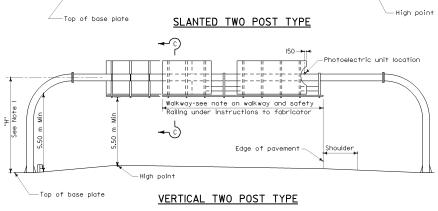
#### MINIMUM CLEARANCE

Vertical roadway clearance 5.50 m above roadway and shoulders

#### WELDING:

All welding continuous unless otherwise noted on the plans.





-Top of base plate

-High point

"H" Note

V)

SLANTED SINGLE POST TYPE

534 Max - Typical

76 Min - Typical

-High point

VERTICAL SINGLE POST TYPE

8 spaces @ 1676 = 13,408

Walkway bracket spacing (example)

Top of base plate-

#### WALKWAY BRACKETS:

Maintain uniform spacing where possible. Maximum spacing shall not exceed L68 m Minimum clear to field splice = 305 mm ±

#### WALKWAY AND SAFETY RAILING:

INSTRUCTIONS TO FABRICATOR

5. Base plate elevation.

7. Walkway location.

I. Sign structure location.

2. Length of structure span. 3. Panel size and location on structure.

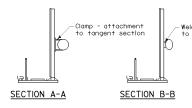
4. Post height to bottom of panel or mast arm elevation.

6. Photoelectric unit location if required.

Format sheet shows:

Walkway to extend full length of sign area and be continuous between signs. Extend walkway to edge of pavement if required. Safety railing to protect entire walkway. PHOTOELECTRIC UNIT:

Place behind sign panel nearest right shoulder unless otherwise shown on format sheet.



Double clamp - attachment of double Welded plate - attachment panel to tangent section to elbow section SECTION C-C

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#### OVERHEAD SIGNS-TUBULAR INSTRUCTIONS AND **EXAMPLES**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S30** 

#### NOTES

1. Maximum post height = 7.3 m + sign panel depth/2.

2. For walkway details, see Standard Plan S16.

3. For safety railing and cable details, see Standard Plan S18.



# Ν

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



**NOTES** 

- The maximum sign panel overlap onto the post elbow shall not exceed 1.83 m from the field splice.
- When several sign panels are to be installed with a space between the panels, the space shall be as small as possible and 610 mm maximum.
- 3. All posts between base plate and field splice are extra strong pipe. All mast arms are standard pipe.
- During sign erection the post shall be raked as necessary with the use of leveling nuts to level the sign panel.
- 5. At final position of post all top and bottom anchor bolt nuts shall be snug tighten against base plate.
- Drill and tap for 41C chase nipple and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-15C.
- 7. NPS Nominal Pipe Size.
- Post type # in Roman or Numerical implies the same specification of pipe post.

		"R"	
Post	Specification	radius	kg/m
type #	of pipe post	(mm)	
I	pipe NPS 20 x 12.7 tk	3658	154.9
H	pipe NPS 24 x 12.7 tk	3658	186.8
HI	pipe NPS 24 x 15.9 tk	3658	232.2
IV	pipe NPS 30 x 12.7 tk	3658	234.5
V	pipe NPS 30 x 15.9 tk	3658	291.7
VI	pipe NPS 30 x 19.05 tk	3658	348.2

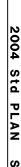
OVE	RHEAD	SIGNS	-TUBULAR
;	SINGLE	POST	TYPE
LAYO	UT AND	PIPE	SELECTIO

S	31	

Span  Maximum sign panel length  "L" = Sign panel length  Sign panel length  Max Field splice  Mast arm  Walkway brackets  1	Span  Maximum sign panel length  "L" = Sign panel length  Sign panel length  Walkway brackets  Drill and tap for 41C conduit and provide handhole, Typ  Bottom of base & (See Project Plans)  VERTICAL POST CANTILEVER
SLANTED POST CANTILEVER	VENTICAL FOST CANTILEVER

333

"D"	"D"	"H"	POST TYPE # FOR SPANS OF CANTILEVER																		
(mm)	(m)	(m)	11.59 m	11.28 m	10.98 m	10.67 m	10.37 m	10.06 m	9.76 m	9.45 m	9.15 m	8.84 m	8.54 m	8.23 m	7.93 m	7.62 m	7.32 m	7.01 m	6.71 m	6.40 m	6.10 m
Panel	Panel	Post	span	span	span	span	span	span	span	span	span	span	span	span	span	span	span	span	span	span	span
Depth	Depth	Height	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #	Col #
3048	3.05	8.84	-	-	-	-	-	-	-	5	4	4	4	4	4	3	3	3	3	2	2
3048	3.05	8.23	-	-	-	-	-	-	-	4	4	4	4	4	3	3	3	3	2	2	2
3048	3.05	7.62	-	-	-	-	-	-	-	4	4	4	4	3	3	3	3	2	2	2	2
3048	3.05	7.01	-	-	-	-	-	-	-	4	4	4	3	3	3	3	2	2	2	2	2
3048		6.40	-	-	-	-	-	-	-	4	3	3	3	3	3	2	2	2	2	2	2
2794	2.79	8.84	-	-	-	-	-	-	4	4	4	4	4	4	3	3	3	3	2	2	2
2794		8.23	-	-	-	-	-	-	4	4	4	4	4	3	3	3	3	2	2	2	2
2794	2.79	7.62	-	-	-	-	-	-	4	4	4	4	3	3	3	3	2	2	2	2	2
2794		7.01	-	-	-	-	-	-	4	4	3	3	3	3	3	2	2	2	2	2	2
2794		6.40	-	-	-	-	-	-	4	3	3	3	3	2	2	2	2	2	2	2	1
2540	2.54	8.84	-	-	-	-	5	4	4	4	4	4	3	3	3	3	2	2	2	2	2
2540		8.23	-	-	-	-	4	4	4	4	4	3	3	3	3	3	2	2	2	2	2
2540		7.62	-	-	-	-	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2
2540		7.01	-	-	-	-	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1
2540		6.40	-	-	-	-	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1
2286		8.84	-	-	5	5	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2
2286		8.23	-	-	4	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2
2286		7.62	-	-	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1
2286		7.01	-	-	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1
2286	2.29	6.40	-		4	4	4	3	3	3	3	2	2	2	2	2	2	2		1	1
2032	2.03	8.84	-	4	4	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	1 1
2032		8.23 7.62	-	4	4	4	4	4	3	3	3	3	3 2	2	2	2	2	2	2	1	1 1
2032			-	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	1	1	1
2032		7.01 6.40	-	4	4	4	3	3	3	3	2		2	2	2	2	2	1	1	1	1
2032 1778	1.78	8.84	4	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	1	1
1778		8.23	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1
1778		7.62	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	1	1	1	1
1778		7.01	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1
1778		6.40	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1
1524		8.84	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1
1524		8.23	4	4	4	4	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1
1524		7.62	4	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1
1524		7.01	4	3	3	3	3	3	2	2	2	2	2	2	2	1	i	1	1	1	1
1524		6.40	3	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1
1270		8.84	4	3	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1
1270		8.23	4	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1
1270	1.27	7.62	3	3	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1
1270		7.01	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
1270		6.40	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1





Trim bracket

between panels 🌶

- © Span = © Optional field splice

-Walkway brackets @ 1.68 m (Max) intervals Max +

See pipe specifications

See Note 8: © Post = © CIDH Pile

"D"= panel depth—

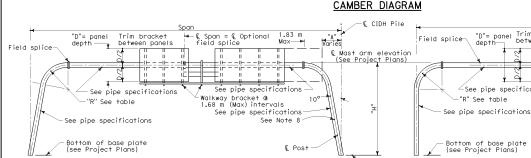
-"R" See table

See pipe specifications



Tillat Satta C42892 p.03-31-200 he State of California or its officers or

o get to the Caltrans web site, go to: http://www.dof.ca.



TYPE # FOR SPAN LENGTH BELOW

to.

4

4

4

4

4

3

3

2

3.23 m 30.18 m 27.13 m

+o

42.68 m|39.63 m|36.59 m|33.54 m|30.49 m|27.44 m|24.39 m|21.34 m|18.29 m|15.24 m

+o

4

4

4

4

4

Field splice

74

Bottom of base plate (see Project Plans)-

to.

24.09 m

to.

21.04 m

to.

2

SLANTED POST

POST

to.

tο

6

4

4

4

4

TABLE A

to.

36.28 m

4

4

5

4

4

### NOTES

- The maximum sign panel overlap onto elbow shall not exceed 1.83 m from the field splice.
- When several sign panels are to be installed with spaces between panels, the total sign panel length is the sum of individual sign panel lengths only.

VERTICAL POST

- 3. For spans ranging from 15.24 m to 44.20 m, maximum sign panel coverage is as follows: 17.99 m
  - a) For slanted post type: Span "A" on both sides from € of CIDH Pile.
  - b) For vertical post type: Span 1.83 m on both sides from € of CIDH Pile.
  - 4. All posts between base plate and field plate splice shall be as scheduled in table. All mast arms are standard pipe.
  - Before any portion of sign frame is assembled in its final position, the Contractor shall demonstrate to the Engineer by preassembly or other approved methods that the span length of the frame, with no load condition, is within ±13 mm of field measured span length between foundations.
  - If sign frames are erected as one unit, they shall be adequately suspended to avoid distortions or changes in span lengths between
  - 7. At final position of post, all top and bottom anchor bolt nuts shall be snug tighten against base plate.
  - 8. Drill and tap for 41C chase nipple and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-15C.
  - 9. Maximum difference between post heights on an individual frame = 1.5 m.
  - 10. For standard pipe members(mast arms) with lengths greater than 24 m, an optional field splice will be permitted at the centerline of span to facilitate hauling operations.
  - 11. NPS = Nominal Pipe Size.
  - 12.R = Radius of 90° elbow.
  - 13. Post type numbers (#) shown in Table A equate to the Roman Numeral post type numbers shown in Tables B and C, same specification of pipe
  - 14. Gap tolerance in between field splices: i.e. if mast arm spool piece is too short. One filler piece in between field shall not exceed 19 mm and bolt tightening according to AISC 9th Edition, TABLE 4, page 5-274.

### TABLE B

Bottom of base plate (see Project Plans)

(See Notes 11 and 12) Post Specification radius kg∕m Туре # of pipe post (mm) pipe NPS 20 x 12.7 tk 3658 154.9 pipe NPS 24 x 12.7 tk 3658 186. pipe NPS 24 x 15.9 tk 3658 232. pipe NPS 30 x 12.7 tk 3658 pipe NPS 30 x 15.9 tk 3658 291.7 VI pipe NPS 30 x 19,05 tk 3658 348,2

#### TABLE C

CAMBER						
Post	Span length	Х	Υ			
type #	(m)	(mm)	(mm)			
ΙI	15.24 to 36.3	57	89			
H	36.6 to 44.2	95	127			
H	15.24 to 36.3	57	89			
H	36.6 to 44.2	95	127			
I۷	15.24 to 36.3	57	89			
I۷	36.6 to 44.2	95	127			
٧	15.24 to 36.3	57	89			
٧	36.6 to 44.2	95	127			
٧I	15.24 to 36.3	57	89			
VI	36.6 to 44.2	95	127			

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#### OVEREHEAD SIGNS-TUBULAR TWO POST TYPE LAYOUT AND PIPE SELECTION

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN **S32** 

"D"

(mm) (m) (m)

3048 3.05 7.62

3048 3.05 7.01

2794 2.79 7.62

2794

2540 2,54 7.62

2286 2.29 8.23

2286 2.29 6.40

2032 2.03 8.23

1778 1.78 8.23

Panel Panel

3048 3.05

3048 3.05 8.84

3048 3.05 6.40

2794 2.79 8.84

2794 2.79 8.23

2540 | 2.54 | 8.84

2540 2.54 8.23

2286 | 2.29 | 8.84

2286 2.29 7.01

2032 2.03 8.84

2032 2.03 6.40

1778 1.78 8.84

1778 1.78 6.40

2794 2.79

2540 2.54

2286 2 29

2032 2.03

2032 2.03

1778 1.78

1778 1.78

Post

8.23

7.01

7.01 2540 2.54 6.40

7.62

7.62

7.01

7.62

7.01

4

4

4

4

4

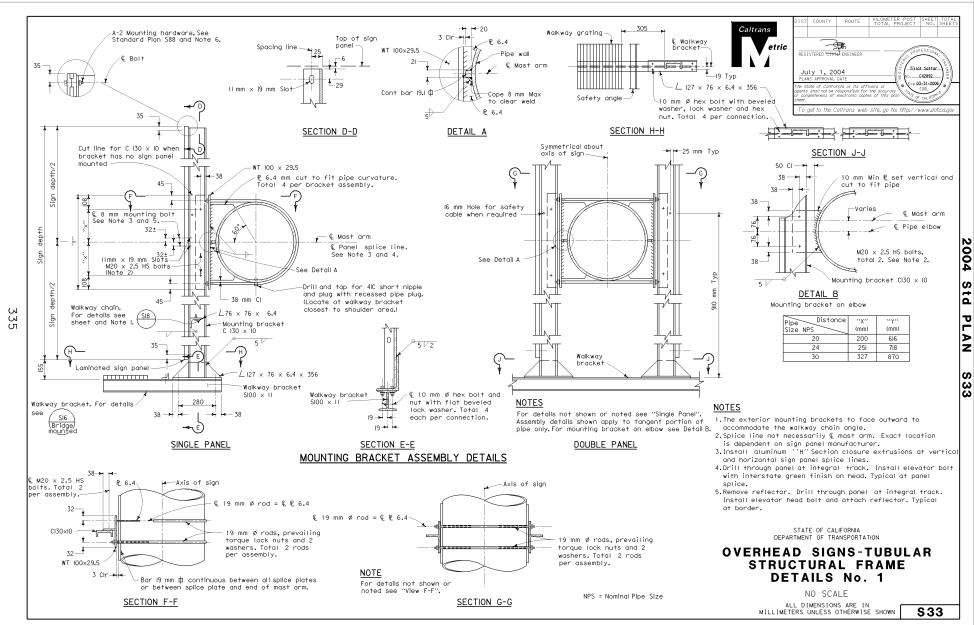
4

4

2.79 6.40

Depth Depth Height 44.21 m 42.38

to.

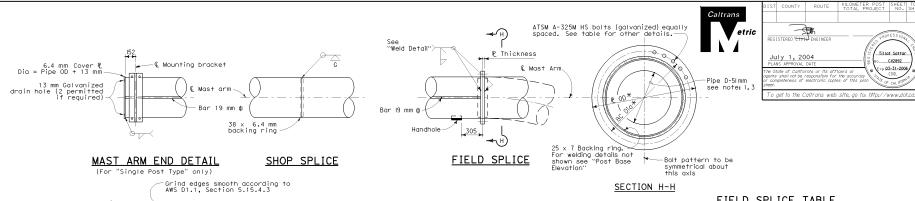




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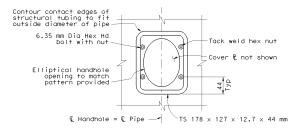
6.35 mm HHCS- 19 mm LS

36

tack weld hex nut inside, total 4

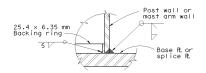
-Post wall

3 mm Neoprene gasket cemented cover P

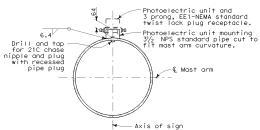


## **ELEVATION**

## DETAILS OF LOWER HANDHOLE & COVER

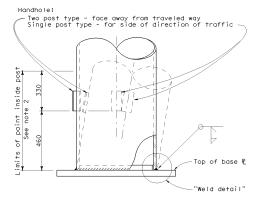


WELD DETAIL



#### PHOTOELECTRIC UNIT DETAILS

(See "Layout" sheet for location when required)



#### POST BASE ELEVATION

"Basic Plate and Anchorage Detail" sheet) (For base R details see

#### FIELD SPLICE TABLE

Pipe Dia NPS	PL OD (mm) *	Thickness (mm)	BC Dia (mm) *	HS Bolts
20	686	35	610	22-M24×3
24	788	38	711	26-M24×3
30	940	41.3	864	34-M24×3

#### NOTE

Design based on capacity of standard pipe.

- Place single thin bead of silicone caulking compound around hole prior to bolting. Caulking not to interfere with friction between plates in bolted area.
- 2. Prime and paint post interior from base R to 150 mm above lower handhole unless post is galvanized.
- 3. "D" is inside diameter of "extra strong pipe".
- Field splice diameters marked "\*" may be increased 51 mm to facilitate bolting.

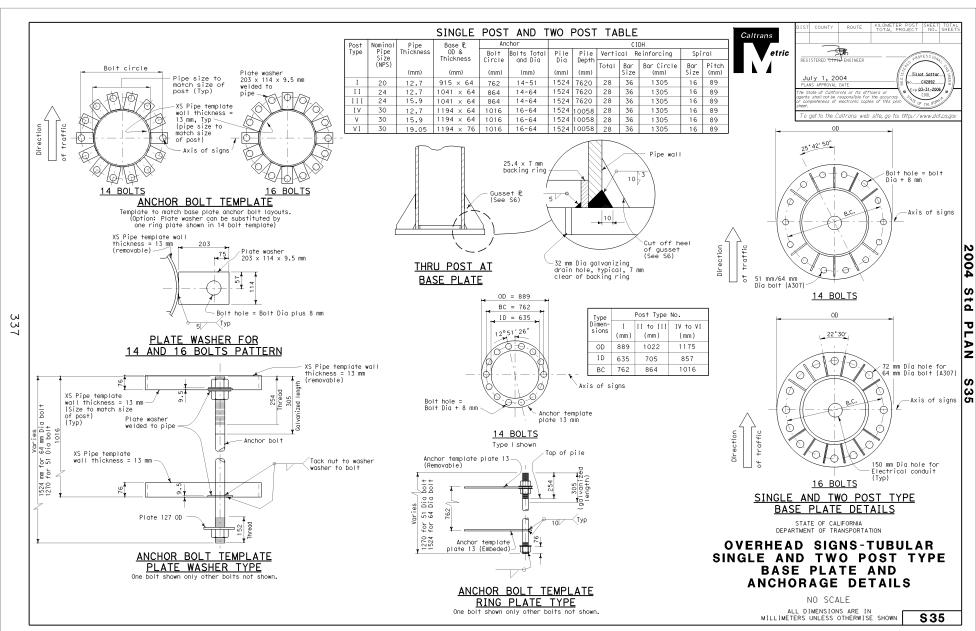
NPS = Nominal Pipe Size.

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#### OVERHEAD SIGNS-TUBULAR STRUCTURAL FRAME **DETAILS No. 2**

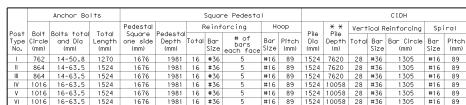
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN









\* \* Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

#### NOTES

- 1. For anchor bolt layout see post sheet.
- 2. For "Base & elevation" see Project Plans.
- Pedestals and base plates, longer sides shall be normal to axis of sign.
- 4. Prior to erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
- Pedestal shall be formed 150 mm minimum below ground surface Remainder to be placed against undisturbed material.
- 6. Slope protection required when indicated on the Project Plans.
- Foundation design is based on 2001 ASSHTO article 13,6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used is 30° and unit weight of soil used is 1922 kg/m².

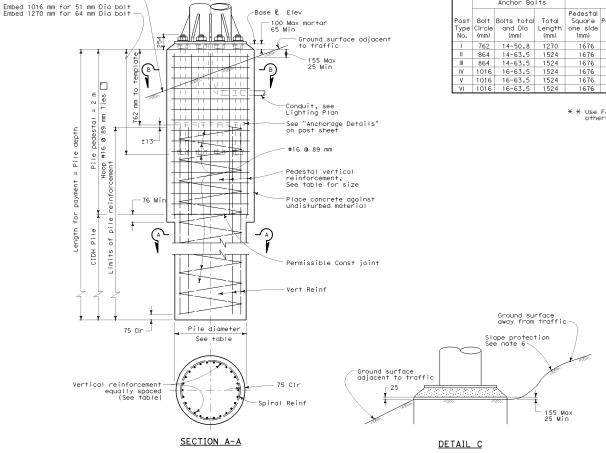
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#### OVERHEAD SIGNS-TUBULAR SINGLE POST AND TWO POST TYPE SQUARE PEDESTAL PILE **FOUNDATION**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S36** 



Pedestal Vert Reinf

Total 16, see table for size

Spiral reinforcement

- Axis of sign

SECTION B-B

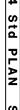
#16 De 89 mm

Vertical reinforcement

Ground surface

 $\omega$  $\alpha$ 

away from traffic -





1305

1305

1305

#16 89

#16 89

89

#16

Round Pedestal CIDH Reinforcing Vertical Reinforcing Spiral Ноор Pile Pile destal Loop Bar Circle Bar Pitch Dia Depth Bar Bar Circle Bar Pitch Depth Total Size (mm) Size (mm) (mm) (mm) Total Size (mm) Size (mm) mm) 1981 16 #36 1435 #16 89 1524 7620 28 #36 1305 #16 89 1981 16 #36 1435 #16 89 1524 7620 28 #36 1305 #16 89 16 #36 1435 #16 89 1524 7620 28 #36 1305 #16 89

se Foundation Depth shown in table unless therwise shown on the Project Plans.

#### **NOTES**

1. For anchor bolt layout see post sheet.

16 #36 1581 #16 89 1524 10058 28 #36

16 #36 1581 #16 89 1524 10058 28 #36 16 #36 1581 #16 89 1524 10058 28 #36

- 2. For "Base & elevation", see Project Plans.
- $_{\rm 3}.$  Prior to erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
- $_{\rm 4.}$  Pedestal shall be formed 150 mm minimum below ground surface Remainder to be placed against undisturbed material.
- 5. Slope protection required when indicated on the Project Plans.
- 6. Foundation design is based on 2001 ASSHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction Dia used 30 degree and unit weight of soil used is 1922 kg/m³.

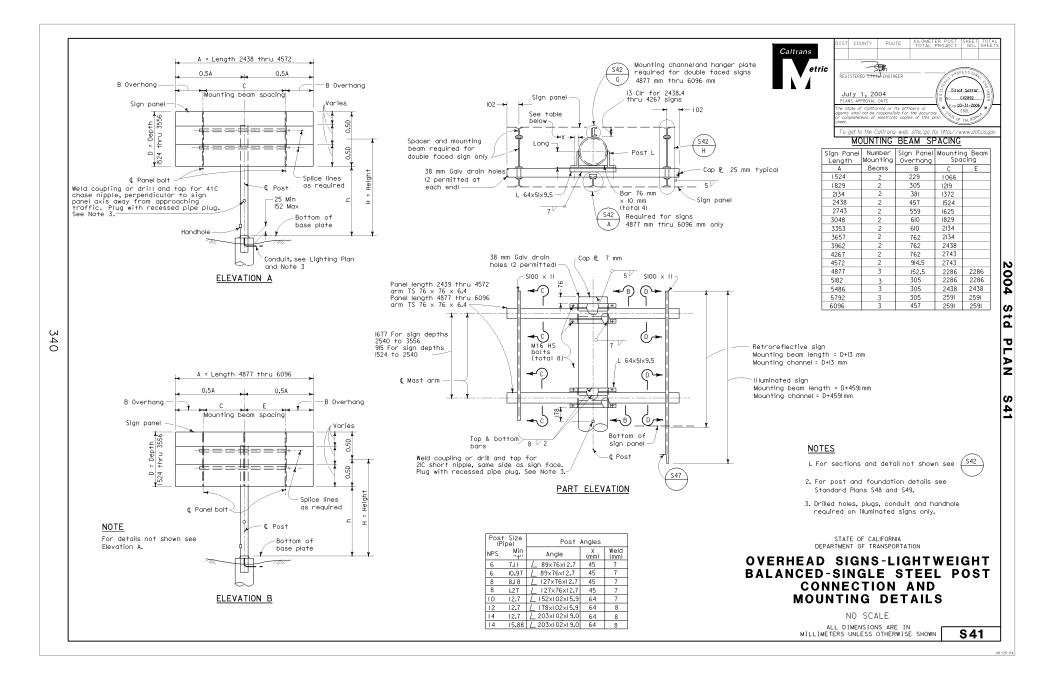
STATE OF CALIFORNIA
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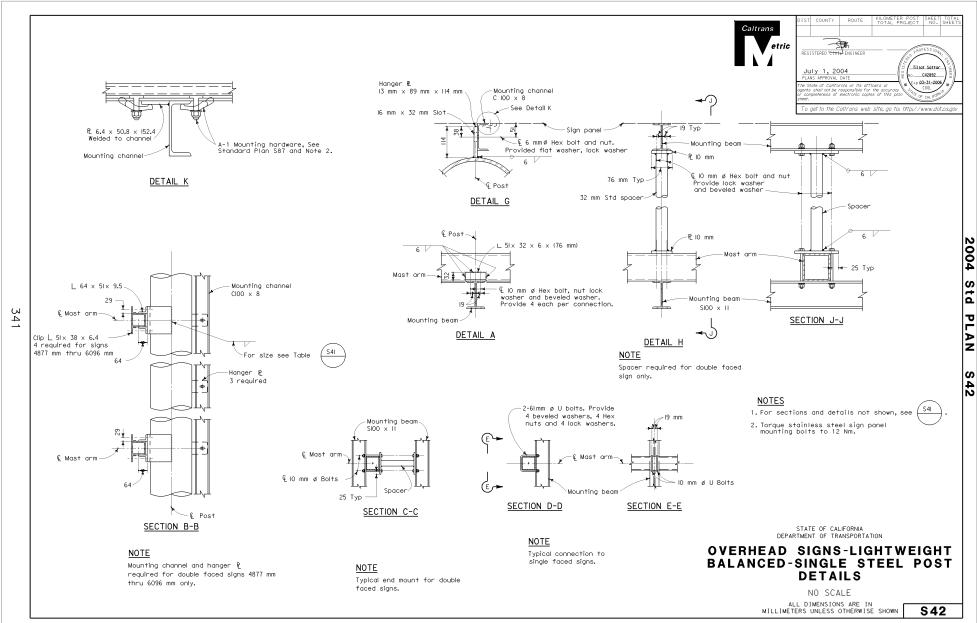
#### **OVERHEAD SIGNS-TUBULAR** SINGLE POST AND TWO POST TYPE **ROUND PEDESTAL** PILE FOUNDATION

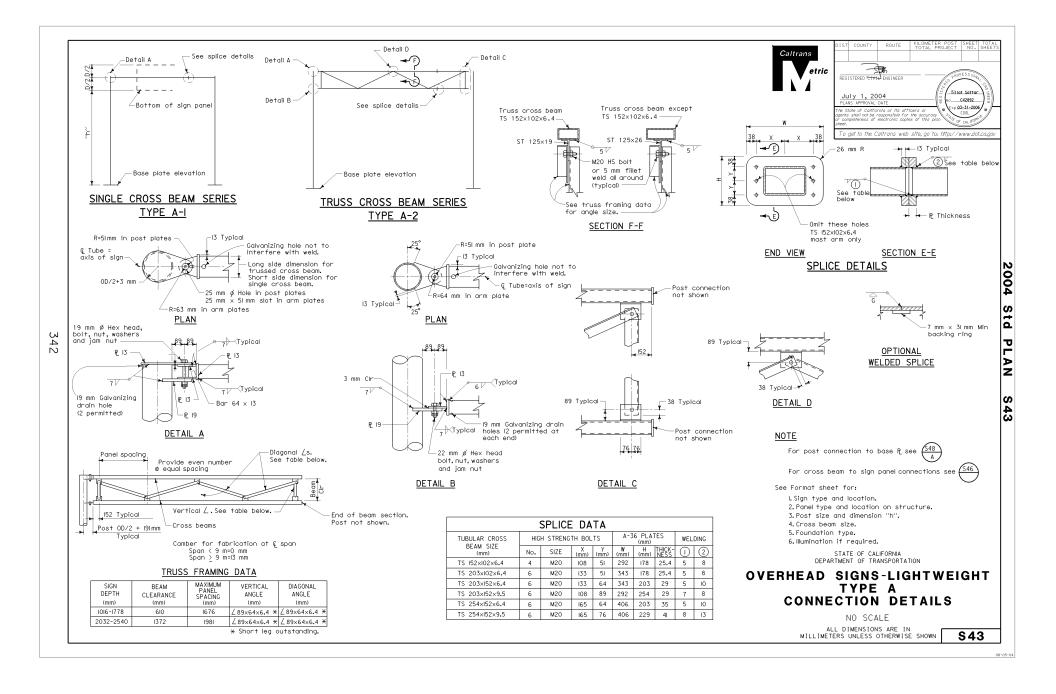
NO SCALE

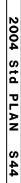
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	Spiral #16 @ 89 mm pitch  Vertical reinforcement  Ground surface  SECTION R-R					
	Ground surface away from traffic SECTION B-B					
339	Embed 1016 mm for 51 mm Dia bolt Embed 1270 mm for 64 mm Dia bolt  100 Max mortar 65 Min Ground surface adjacent to traffic See "Anchorage Details" on post steet  100 Max mortar 65 Min Ground surface adjacent to see "Anchorage Details" on post steet  100 Max mortar 65 Min For for file See "Anchorage Details" on post steet  100 Max mortar 65 Min For for file See "Anchorage Details" on post steet  100 Max mortar 65 Min For for file See "Anchorage Details" on post steet For for file For file For for file F	Type Ci No. (I I	Anchor Bo  Solt Bolts Toto ircle & Dia (mm) 762 14-53.8 864 14-63.5 1016 16-63.5 1016 16-63.5 1016 16-63.5  Solt Bolts Toto (Ground Gway fr Slope protsee note 6	Total   Length (mm)   1270   1524	(mm) 1676 1676 1676 1676 1676 1676 1676 167	Pede Dee (m 15 15 15 15 15 15 15 15 15 15 15 15 15













#### POST TO ARM FRAMING DATA

MAST ARM ANGLES						
ARM SIZE	ANGLE (mm)	HS BOLT	Y (mm)	WELD (mm)		
TS 76 × 76 × 6.4	L51 x 51 x 9.5	M16	29	7		
TS 102 x 102 x 6.4	L64 × 51 × 9.5	M16	29	7		
TS 127 x 127 x 6.4	L76 × 64 × 9.5	M16	35	7		
TS 152 x 152 x 6.4	L89 × 64 × 9.5	M16	35	7		
TS 178 × 178 × 6.4	L102 x 76 x 1.27	M20	45	8		
TS 203 x 203 x 6.4	L127 x 76 x 12.7	M22	45	8		
TS 254 x 254 x 6.4	L152 x 102 x 15.9	M22	64	8		

SEE OTHER PLAN SHEETS FOR

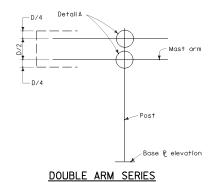
I. Sign type and location

4. Mast arm size. 5. Foundation type. 6.IIIumination if required.

3. Post size and dimension "h".

2. Paneltype and location on structure





TYPE B-2

C Post

SECTION C-C

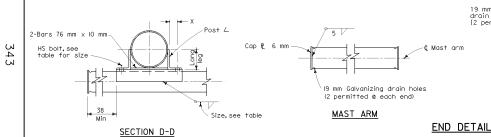
Long leg

Size, see table

HS bolt see

table for size

	POST ANGLES						
POST SIZE	ANGLE	X (mm)	WELD (mm)				
6	L102 × 76 ×12.7	45	7				
8	L127× 76 ×12.7	45	7				
10	L152×1102×15.9	64	7				
12	L178 x 102 x15.9	64	8				
14	L203×102×19.0	64	8				



Detail A

Base P elevation

-¢ Post

DETAIL A

Post ~

Top & bottom 76 mm × 10 mm bars

HS bolt see

table for size

SINGLE ARM SERIES TYPE B-I

Mast arm

19 mm Galvanizing drain holes (2 permitted) —Cap ₽ 6 Detail A POST CAP

**NOTES** 

For mast arm length and mast arm-to-sign panel connections see

Top & bottom> bars Mast arm / Mast arm

DETAIL B

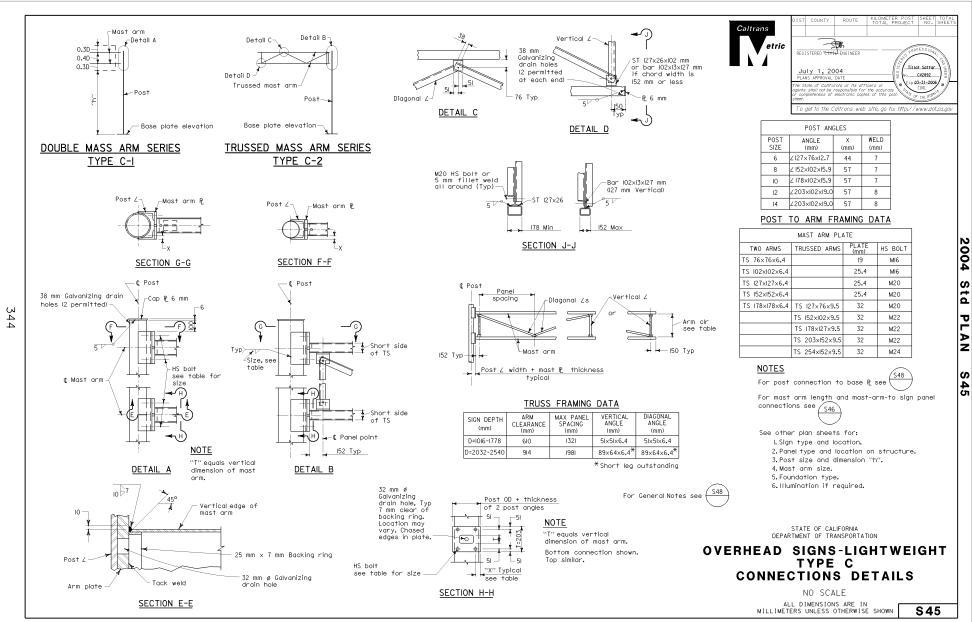
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

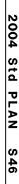
#### **OVERHEAD SIGNS-LIGHTWEIGHT** TYPE B **CONNECTION DETAILS**

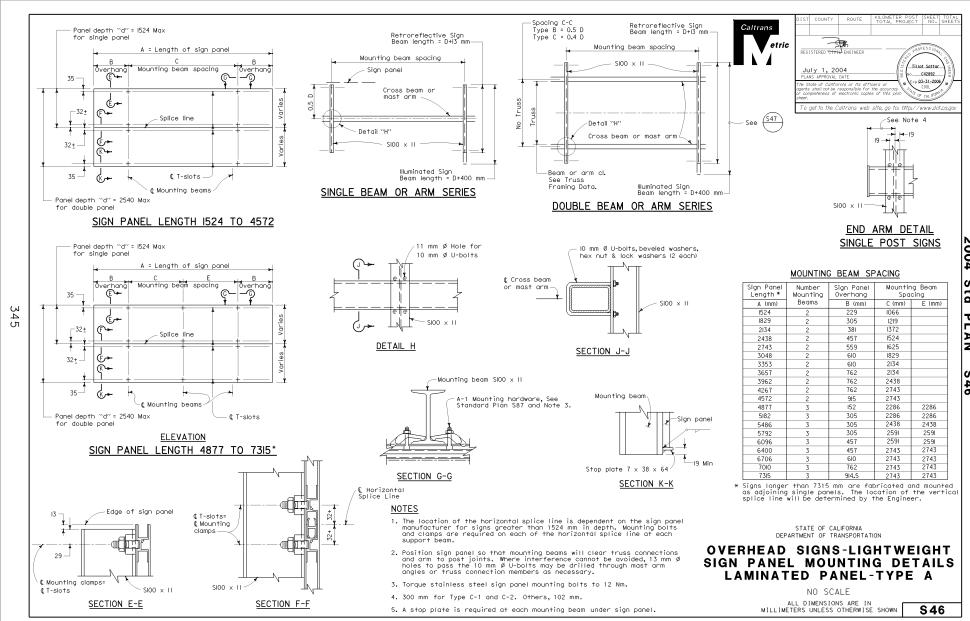
NO SCALE

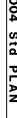
**S44** 





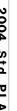












REGISTERED THE ENGINEER Tillat Satta C42892 co 03-31-200

July 1, 2004 he State of California or its officers o

get to the Caltrans web site, go to: http://www.dot.ca.

ROUTE

Photoelectric unit 3-prong, EE-NEMA standard, twist lock plug receptacle SI00 x 11-3½ NPS Standard pipe € grade A permitted 64 mm or as detailed on electrical plans 50 mm Dia hole PART SECTION B-B **PHOTOELECTRIC** 

UNIT

#### SIDE VIEW - DOUBLE FACED SIGN - END MOUNT

45

--- ∠ 76×76×6.4

M16

HS bolt

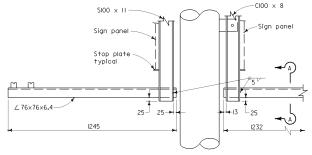
Varies

#### NOTE

For details not shown see "Side View - Single Faced Sign Type A, B & C" details.

1220

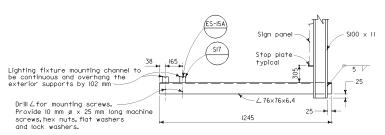
# -CI00 x 8 PART SECTION A-A



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#### SIDE VIEW - DOUBLE FACED SIGN - CENTER MOUNT

(Required only on balanced single post sign panel length 4877 thru 7315)



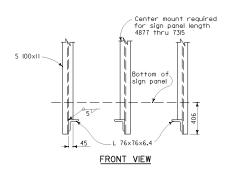
SIDE VIEW - SINGLE FACED SIGN TYPES A, B & C LIGHTING FIXTURE MOUNTING DETAIL SIGNS GREATER THAN 1676 mm IN LENGTH

Sign panel

Stop plate typical

**-**√B)

1220

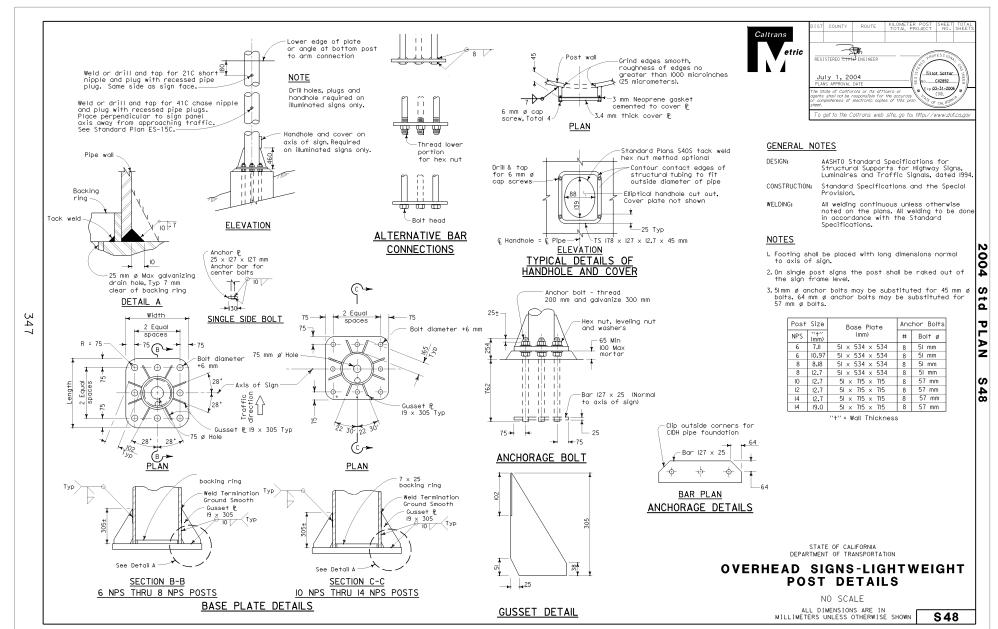


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#### **OVERHEAD SIGNS-LIGHTWEIGHT** LIGHT FIXTURE **MOUNTING DETAILS**

NO SCALE

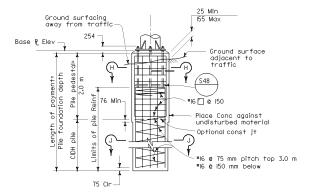
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



- I. Backfill shall be in place prior to erection of post.
- 2. Slope protection required when indicated on the plans.
- Pile pedestal shall be formed I55 mm minimum below ground surface. Remainder to be placed against undisturbed material.







Reinforcement

Top Bottom | Bar

#16

#16

#16

#16

#25

#25

**=**25

=25

=16

#16

#16 #16

#16 #16

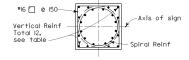
#16

#25

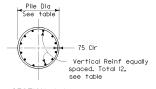
#19 #25

#25 #29

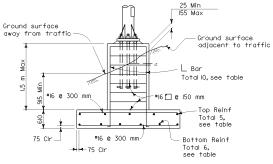




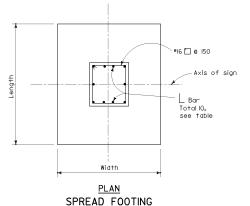
#### SECTION H-H



6 NPS THRU I4 NPS POSTS
PILE FOUNDATION



#### **ELEVATION**



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

### OVERHEAD SIGNS-LIGHTWEIGHT FOUNDATION DETAILS

NO SCALI

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

S49

POST SIZE

(mm)

7.11

10.97

PILE FOUNDATION

762 3.0

762 3.0

762 3.0

914 4.9

Vertical

Reinf

#19

#19

#19

#32

Pedestal

(mm)

762 x 762

762 × 762

762 × 762

914 × 914

914 × 914

914 × 914

914 × 914

Footing

1.3 × 1.9

1.3 × 2.2

1.6 × 2.5

I.9 x 2.8

2.2 × 3.1

2.2 × 3.7

2.2 × 4.0

2.5 × 4.3

Pedestal

(mm)

864 × 864

864 × 864

864 × 864

10 12.7 1016 × 1016 914 4.0

12 12.7 1016 × 1016 914 4.6

14 12.7 1016 × 1016 914 4.6

8.18 864 × 864

14 15.88 1016 × 1016

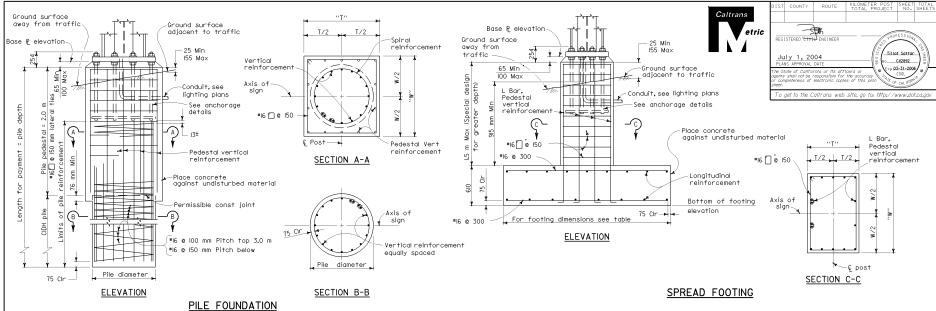
2004

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td PLAN

တ

\* Bundled bars



				T	NO POST	TYPE					
Post	Pedestal	Pile	Found	ation			Spread Foo	oting			
Туре	Size	Vertical	Pile	Pile	Pedestal	Footing	Тор	Reinf	Bottom	Rein	f
.,,,,	"T" × "W" (m) × (m)	Reinf	Dia	Depth	Vert Reinf	Dimension (m)	Longitudinal	Transverse	Longitudinal	Trans	verse
		10. 005	(mm)	(m)			7 810	700			700
A-I	1050 x 1250	16-#25	920	4.3	14-#22	2.2 x 4.9	7-#16	#16 @ 300	6-#29	#16 @	300
A-2		16-#29		4.9	14-#25	2.5 x 5.2	10-#16	T	10-#29		<u> </u>
A-3		16-#36		6.1	14-#29	2.5 x 5.5	8-#19		9-#36		_
A-4		*24-*36		6.4	14-#29	2.5 x 6.1	8-#25		11-#36		
A-5	+	*24-*36		6.4	14-#32	2.5 x 6.1	8-#25		II-#36		
B-I	1.05 x 1.35	* 16-#36		6.1	14-#25	$2.5 \times 5.5$	8-#19		9-#36		
B-2	1.05 x 1.35	*24-#36		6.7	14-#29	2.5 x 6.1	10-#19		II-#36		
B-3	1.05 x 1.40	*28-#36	<b>+</b>	7.4	14-#32	2.5 x 6.4	7-#25		13-#36		
B-4	1.20 x 1.40	* 24-#36	1070	6.7	14-#32	2.5 x 6.7	7-#25		14-#36		
B-5	1.20 x 1.40	*24-*36	1070	7.0	14-#32	2.5 x 7.1	8-#25		15-#36		
C-I	1.05 x 1.05	16-#29	920	4.9	14-#22	2.2 x 4.9	6-#19		7-#36		
C-2	1.05 x 1.15	16-#36		5.8	14-#29	2.5 x 5.2	8-#19		9-#36		
C-3	1.05 x 1.15	*24-*36		6.4	14-#32	2.5 x 5.8	9-#19		11-#36		
C-4	1.05 x 1.15	*28-#36		7.4	14-#32	2.5 x 6.4	7-#25		13-#36		
C-5	1.20 x 1.20	*24-#36	1070	6.7	14-#36	2.5 x 6.7	8-#25		15-#36		
C-6		*24-#36		7.1	14-#36	2.5 x 7.1	8-#25		16-#36		
C-7		*28-#36		7.4	14-#36	2.5 x 7.1	8-#25		12-#43		
C-8		*34-#36	<b>.</b>	7.7	* 28-*32	2.5 x 7.4	9-#25		13-#43		
D-I	1.05 x 1.25	*24-#36	920	6.4	14-#29	2.5 x 5.8	9-#19		10-#36		
D-2	1.05 x 1.30	* 28-#36	920	7.4	14-#32	2.5 × 6.4	7-#25		13-#36		
D-3	1.20 x 1.30	*24-#36	1070	7.4	14-#36	2.5 x 7.1	8-#25		16-#36		
D-4		*34-*36		8.3	14-#36	2.5 x 7.1	8-#25		18-#36		
D-5	Ų.	*34-#36		9.2	* 28-*32	2.5 × 7.7	9-#25		14-#43		
D-6	1.30 x 1.40	* 34-#36		9.2	14-#36	2.5 x 8.0	10-#25		14-#43		
D-7		* 34-#36	ı i	9.2	14-#36	2.5 x 8.0	10-#25	#16 @ 300	15-#43	#16 @	300

	SINGLE POST TYPE										
Post	Pedestal	Pile	Found	dation			Spread Fo	oting			
Туре	Size	Vertical	Pile	Found- ation	Pedesta Vert	Footing	Top	Reinf	Bottom	Reinf	
	"T" × "W" (m) × (m)	Reinf	Dia (mm)	Depth (m)	Reinf	Dimension (m)	Longitudinal	Transverse	Longitudinal	Transverse	
E-I	1.02 x 1.12	16-#25	920	4.0	14-#25	2.5x 4.3	6-#16	#16 @ 300	9-#22	#I6 @ 300	
E-2	1.02 x 1.12	16-#29		4.6	14-#29	2.8 x 4.6	6-#19		9-#29	+	
E-3	1.12 x 1.12	16-#32		5.5	14-#32					•	
E-4	1.12 x 1.12	16-#36		6.1	14-#36						
F-I	1.02 x 1.12	16-#25		4.0	14-#22	2.5 x 4.0	8-#16	#I6 @ 300	10-#22	#I6 @ 300	
F-2		16-#29		4.6	14-#22	2.5 x 4.6	8-#16		11-#25		
F-3		16-#29		4.9	14-#25	2.5 x 4.9	9-#16		10-#29		
F-4		16-#36		5.8	14-#29	2.5 x 5.8	6-#19	+	10-#36	+	
F-5		16-#36	<b>.</b>	6.7	14-#32	2.5 x 6.1	10-#19	#16 @ 300	12-#36	#16 @ 300	

#### <u>NOTES</u>

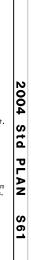
- Base plates, pedestals and footings; longer sides shall be normal to axis of sign.
- 2. For anchor bolt layout see Standard Plans S66 and S70.
- 3. For base plate elevation see Format sheet.
- 4. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
- 5. Pile pedestal shall be formed 155 mm minimum below ground surface. Remainder to be placed against undisturbed material.
- 6. Pile footing use foundation depth shown in table unless otherwise shown on Format sheet.
- On single post sign structures the post shall be raked out of plumb with the use of the levelling nuts to make the bottom of the sign frame level.

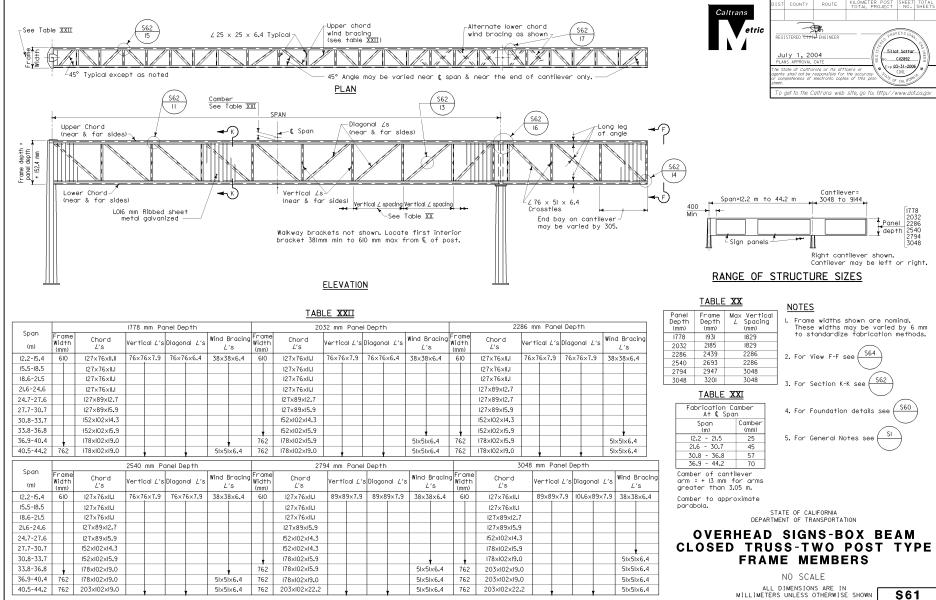
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## OVERHEAD SIGNS-BOX BEAM CLOSED TRUSS FOUNDATION DETAILS

NO SCALE

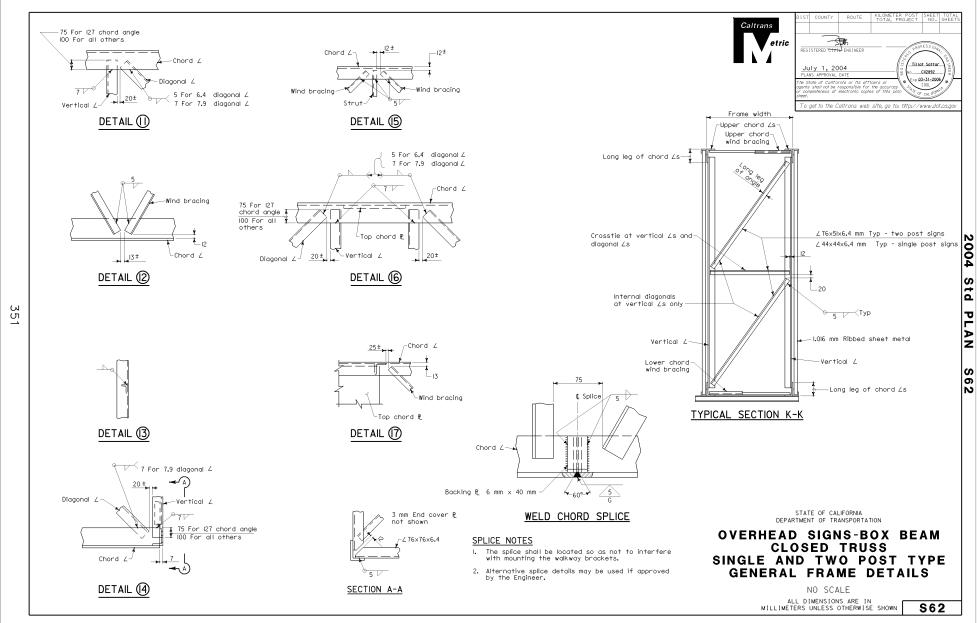
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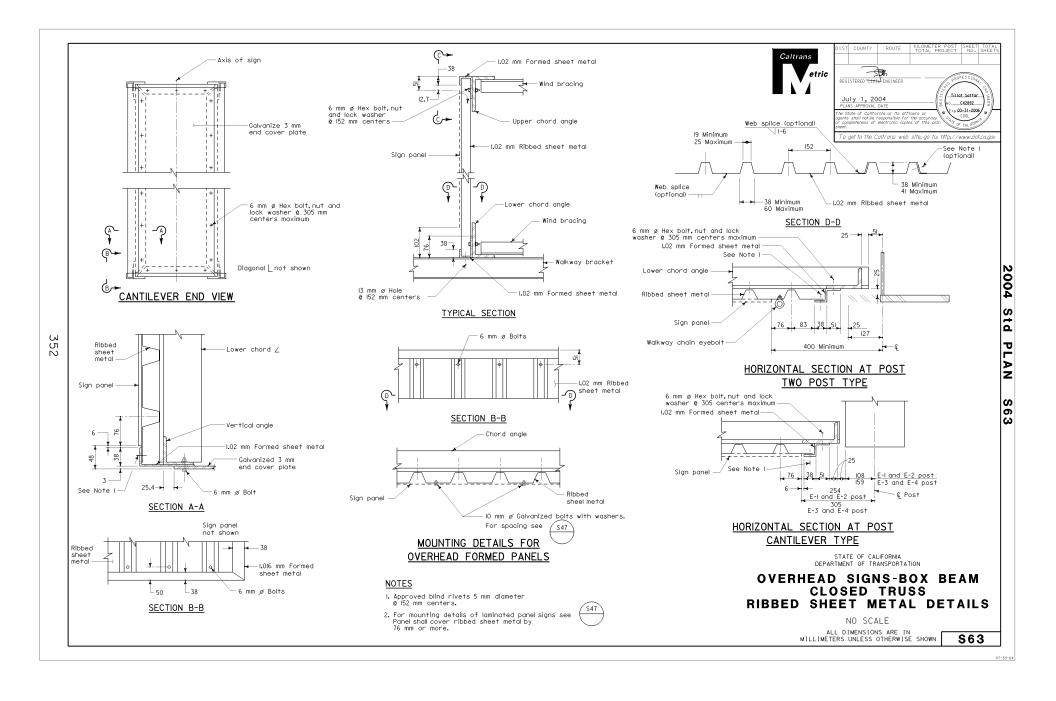


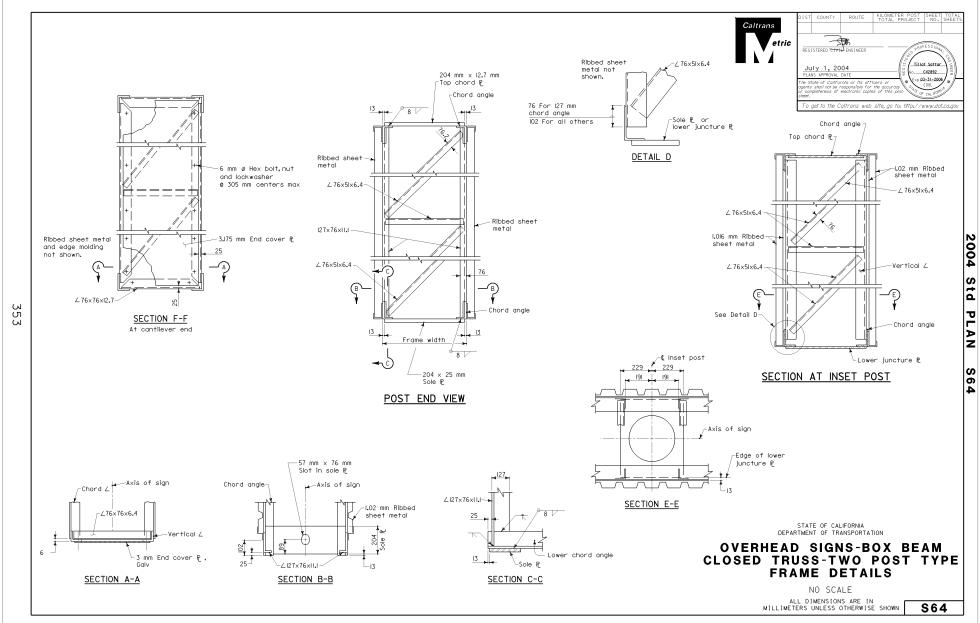


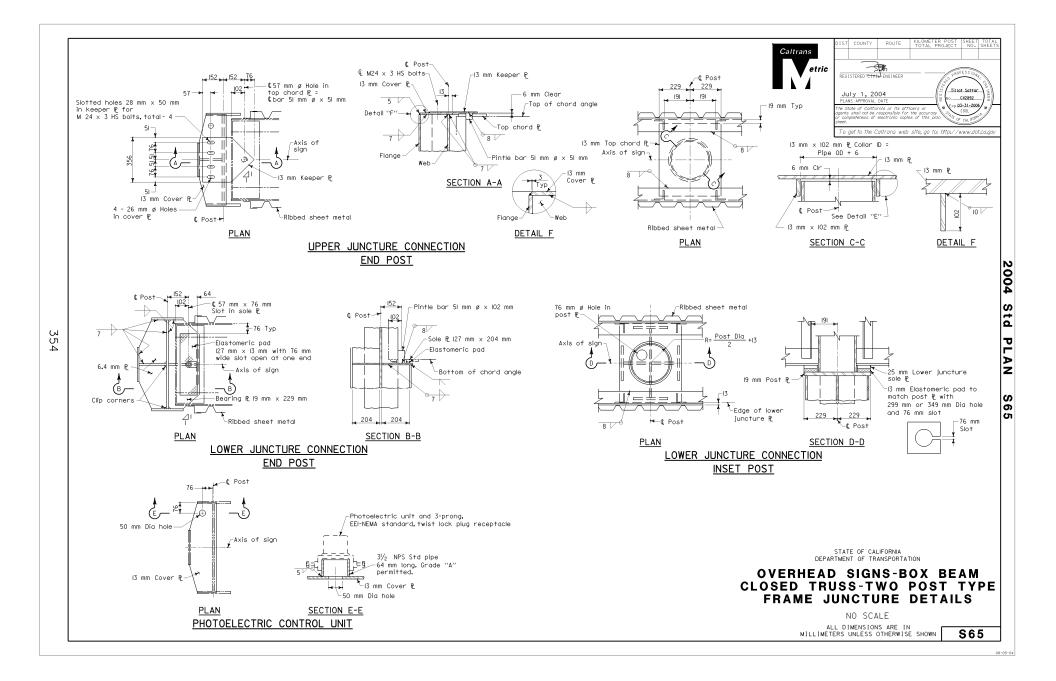
50

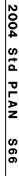
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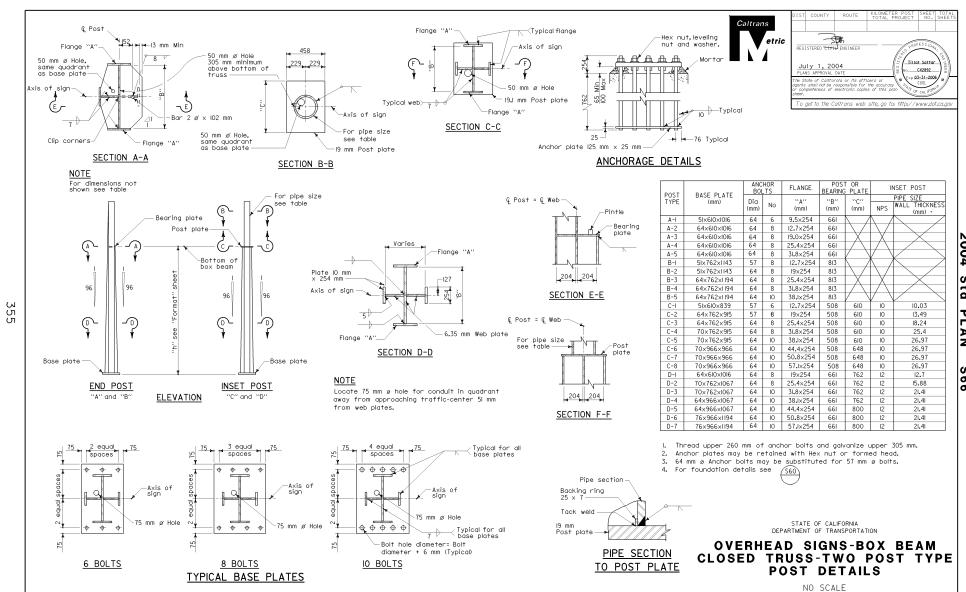




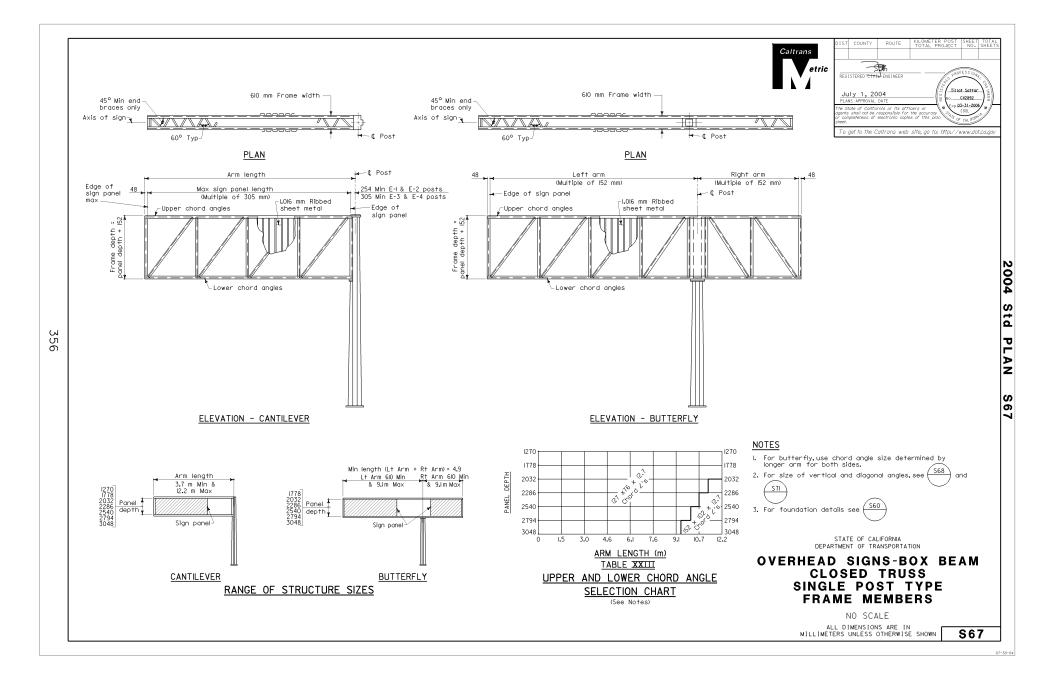


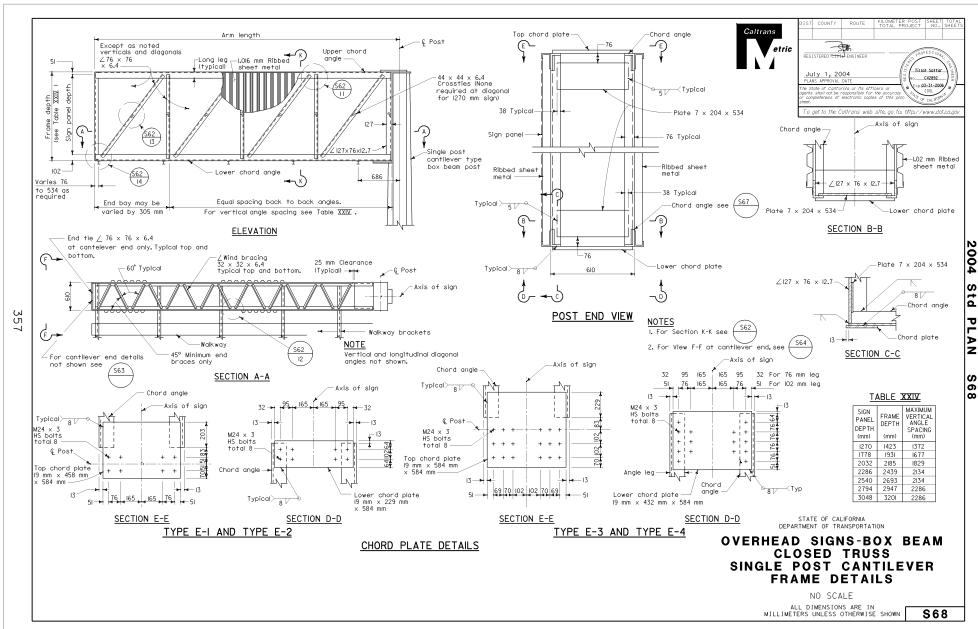


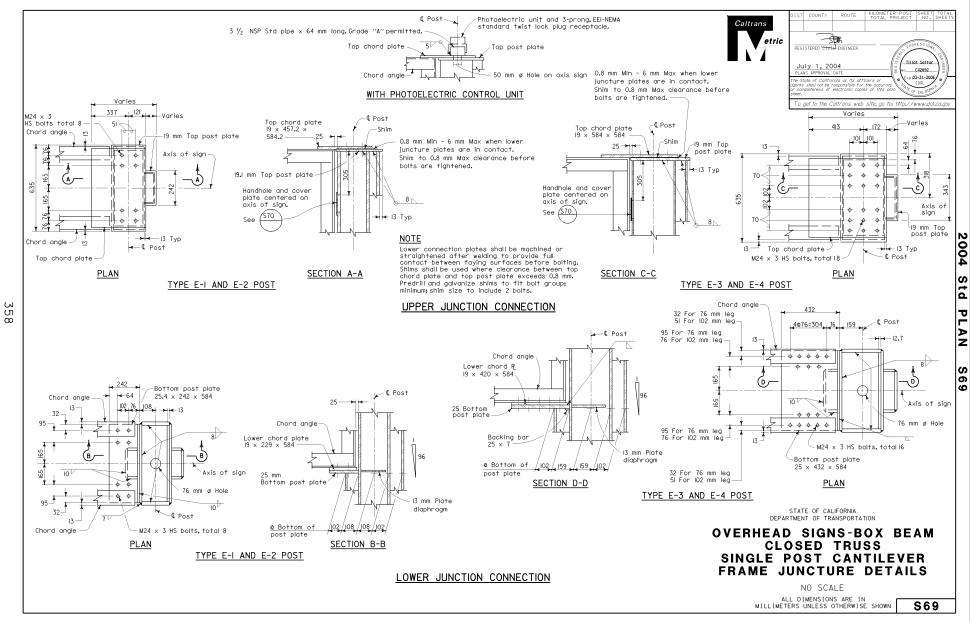


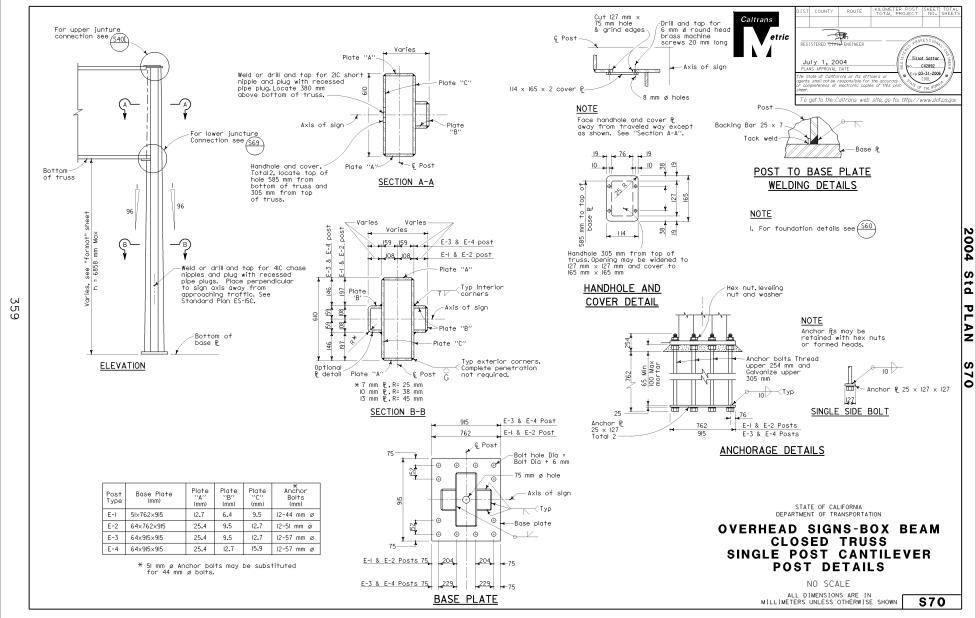


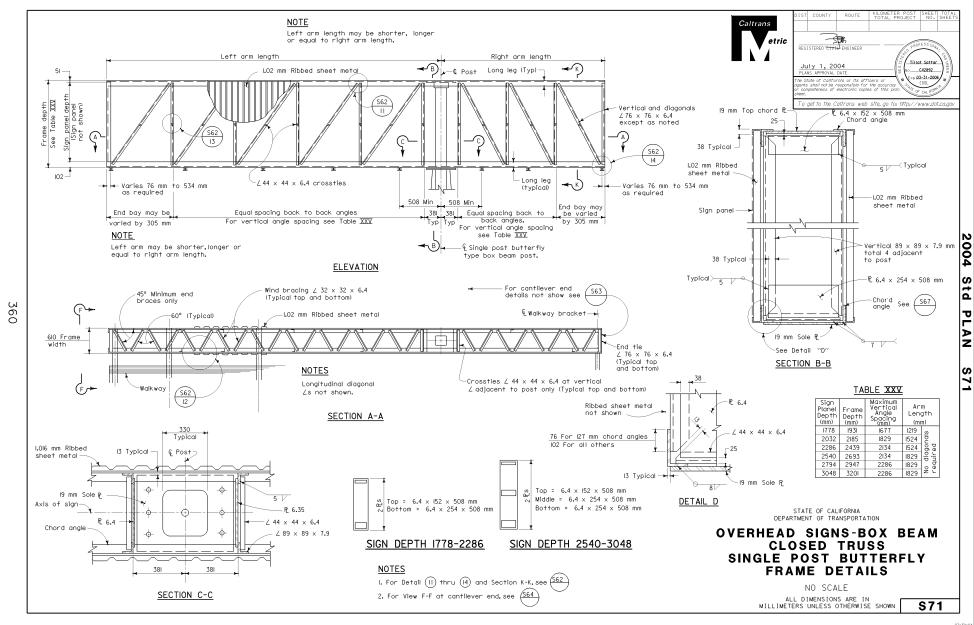
**S66** 

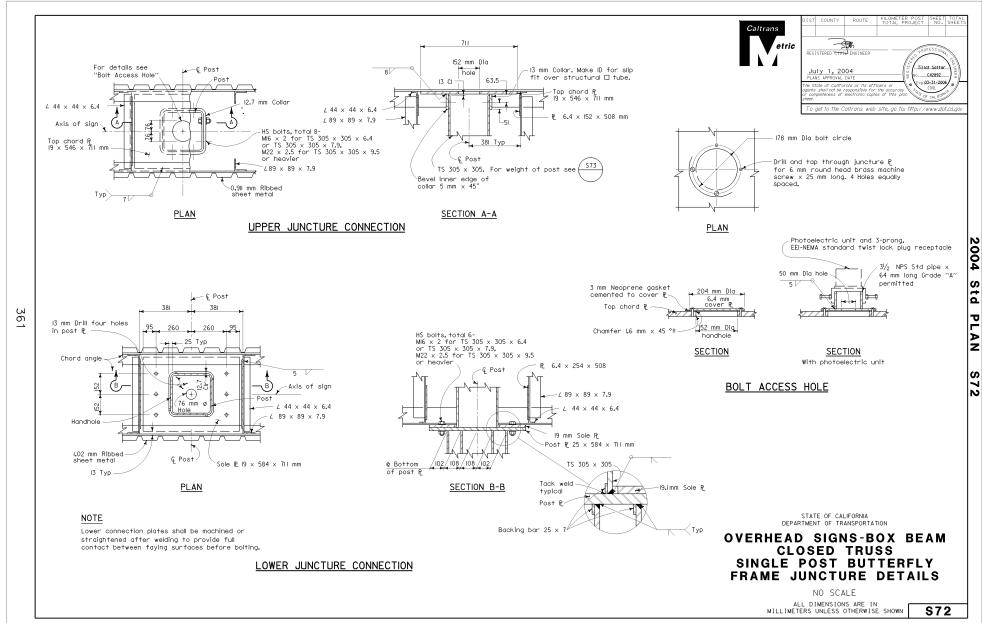


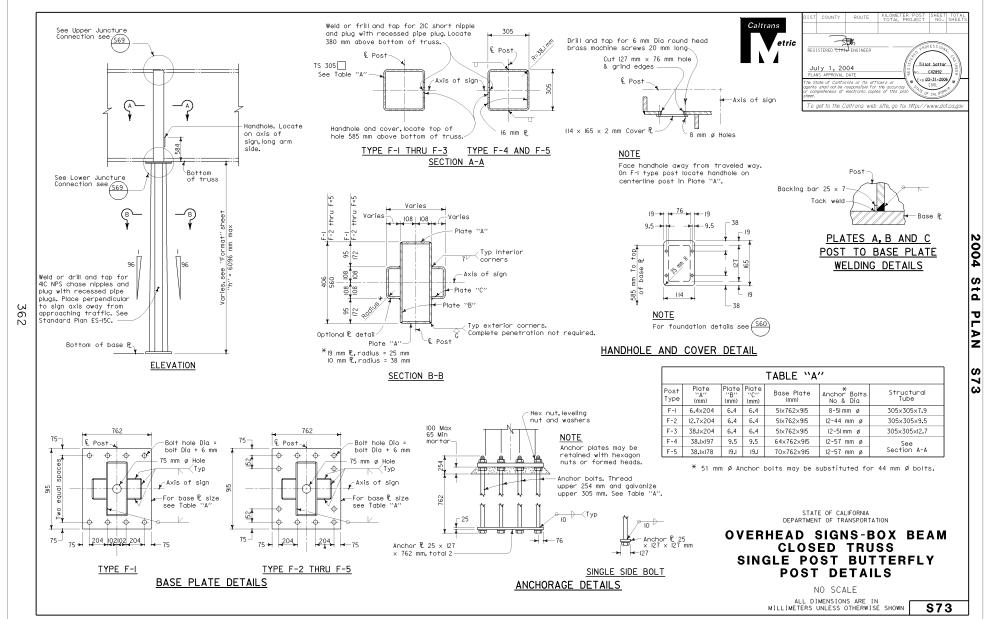


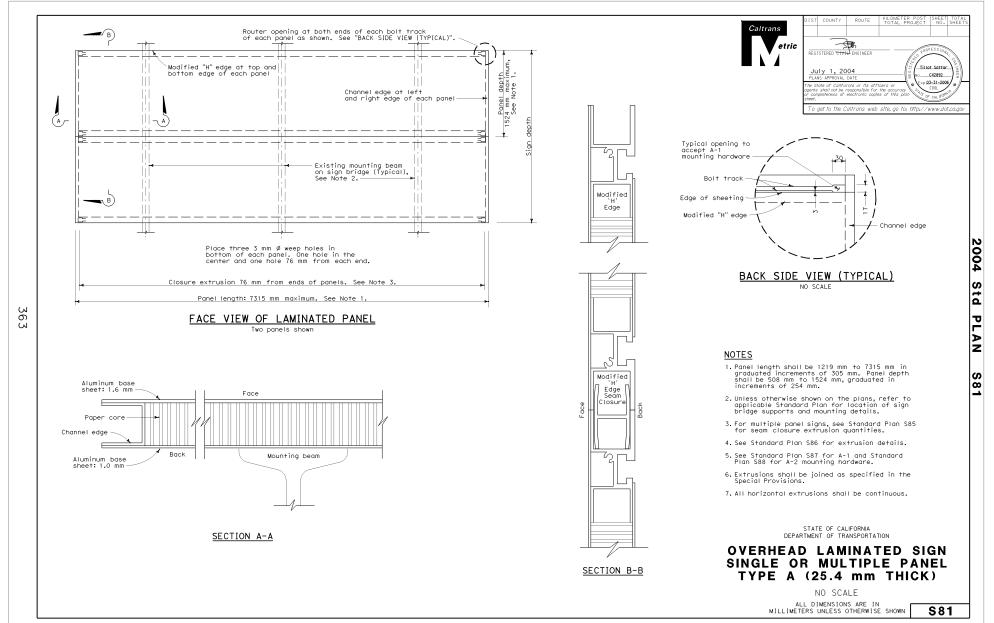


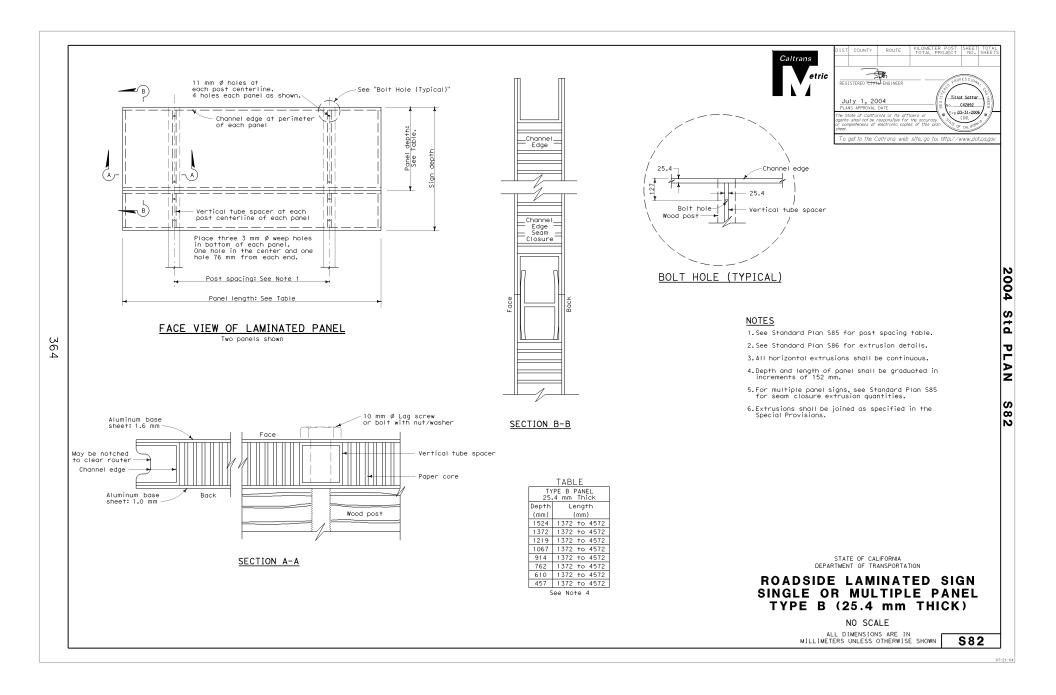


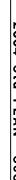










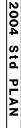


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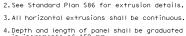
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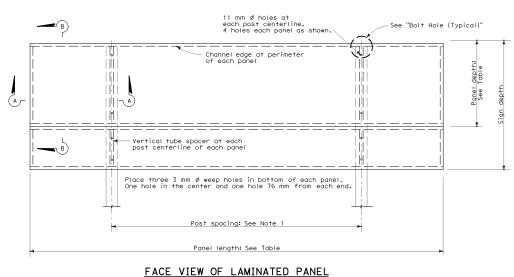


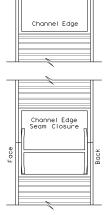
1. See Standard Plan S85 for post spacing table.

- 4.Depth and length of panel shall be graduated in increments of 152 mm.
- 5. For multiple panel signs, see Standard Plan S85 for seam closure extrusion quantities.
- 6.Extrusions shall be joined as specified in the Special Provisions.



**S83** 





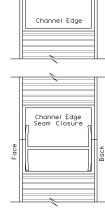


TABLE TYPE B PANEL 63.5 mm Thick Depth Length (mm) (mm) 1524 4724 to 5029 4724 to 5639 1219 4724 to 6248 1067 4724 to 7163 4724 to 7315 914 762 4724 to 7315 610 4724 to 7315 457 4724 to 7315 See Note 4

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NOTES

Two panels shown

#### SECTION B-B

#### 10 mm Ø Lag screw or bolt with nut/washer Aluminum base sheet: 1.6 mm Face Channel edge Paper core May be notched to clear router

Wood post

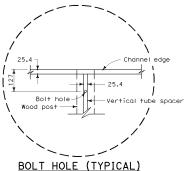
Vertical tube spacer

SECTION A-A

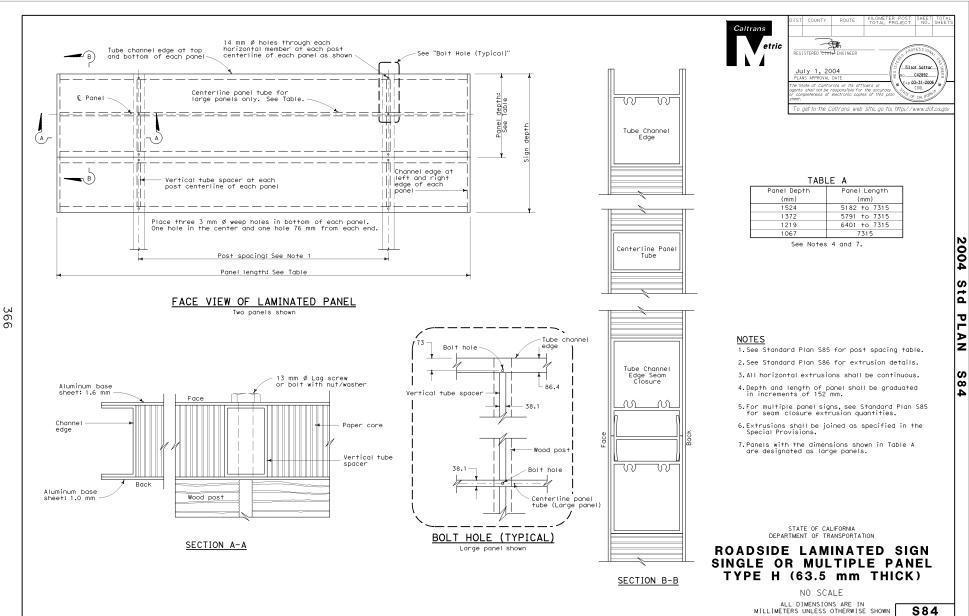
Back

Aluminum base sheet: 1.0 mm

36



NO SCALE







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PLAN VIEW

#### 25.4 mm PANEL

25	0.4 mn	1 PANEL	-
	Number		
Length of Sign	of	Overhang	Post Spacin
Α	Posts	В	С
1372 mm	2	152 mm	1067 mm
1524 mm	2	229 mm	1067 mm
1676 mm	2	305 mm	1067 mm
1829 mm	2	305 mm	1219 mm
1981 mm	2	381 mm	1219 mm
2134 mm	2	381 mm	1372 mm
2286 mm	2	457 mm	1372 mm
2438 mm	2	457 mm	1524 mm
2591 mm	2	508 mm	1575 mm
2743 mm	2	559 mm	1626 mm
2896 mm	2	584 mm	1727 mm
3048 mm	2	610 mm	1829 mm
3200 mm	2	610 mm	1981 mm
3353 mm	2	610 mm	2134 mm
3503 mm	2	686 mm	2134 mm
3658 mm	2	762 mm	2134 mm
3810 mm	2	762 mm	2286 mm
3962 mm	2	762 mm	2438 mm
4115 mm	2	762 mm	2591 mm
4267 mm	2	762 mm	2743 mm
4420 mm	2	914 mm	2591 mm
4572 mm	2	914 mm	2743 mm

#### 63.5 mm PANEL

	Number		
Length of Sign	of	Overhang	Post Spacing
A	Posts	В	С
4724 mm	2	914 mm	2896 mm
4877 mm	2	991 mm	2896 mm
5029 mm	2	991 mm	3048 mm
5182 mm	2	991 mm	3200 mm
5334 mm	2	1067 mm	3200 mm
5486 mm	2	1067 mm	3353 mm
5639 mm	2	1143 mm	3353 mm
5791 mm	2	1143 mm	3505 mm
5944 mm	2	1143 mm	3658 mm
6096 mm	2	1229 mm	3658 mm
6248 mm	2	1229 mm	3810 mm
6401 mm	2	1295 mm	3810 mm
6553 mm	2	1295 mm	3962 mm
6706 mm	2	1295 mm	4115 mm
6858 mm	2	1372 mm	4115 mm
7010 mm	2	1372 mm	4267 mm
7163 mm	2	1372 mm	4420 mm
7315 mm	2	1448 mm	4420 mm

## "H" Sections will be set in 76 mm from edge of panels to allow for rivet clearance in borders. Standard length in stock: 914 mm, 1067 mm, 1219 mm, 1372 mm, 1524 mm and 1676 mm.

SEAM CLOSURE "H" SECTION EXTRUSION

Panel Closure

Length Length

"H" Section extrusion

TYPICAL SEAM CLOSURE DETAIL

36

067 mm 914 mm 219 mm 1067 mm 1-1067 mm

372 mm 1219 mm 1-1219 mm

1524 mm 1372 mm 1-1372 mm

676 mm 1524 mm 1-1524 mm 1829 mm 1676 mm 1-1676 mm 981 mm 1829 mm 2-914 mm

2134 mm 1981 mm 1-914 mm, 1-1067 mm 2286 mm 2134 mm 2-1067 mm 2438 mm 2286 mm 1-1067 mm, 1-1219 mr 2591 mm 2438 mm 2-1219 mm 2743 mm 2591 mm 1-1219 mm, 1-1372 mr 2896 mm 2743 mm 2-1372 mm 3048 mm 2896 mm 1-1372 mm, 1-1524 mm 3200 mm 3048 mm 2-1524 mm 3353 mm 3200 mm 1-1524 mm, 1-1676 mm 3505 mm 3353 mm 2-1676 mm

3658 mm 3505 mm 2-1219 mm, 1-1076 mm

4420 mm 4267 mm 2-1372 mm, 1-524 mm

4572 mm 4420 mm 2-1524 mm, 1-1372 mm 4724 mm 4572 mm 3-1524 mm 4877 mm 4724 mm 2-1676 mm, 1-1372 mm 5029 mm 4877 mm 2-1676 mm, 1-1524 mm

5182 mm 5029 mm 3-1676 mm 5334 mm 5182 mm 3-1219 mm, 1-1524 mm

5486 mm 5334 mm 3-1372 mm, 1-1219 mm

3810 mm 3658 mm 3-1219 mm 3962 mm 3810 mm 2-1219 mm, 1-1372 mm 4115 mm 3962 mm 2-1372 mm, 1-1219 mm 4267 mm 4115 mm 3-1372 mm

5693 mm 5486 mm 4-1372 mm 5791 mm 5693 mm 3-1372 mm, 1-1524 mm 5944 mm 5791 mm 3-1524 mm, 1-1219 mm 6096 mm 5944 mm 3-1524 mm, 1-1372 mm

6248 mm 6096 mm 4-1524 mm 6401 mm 6248 mm 3-1676 mm, 1-1219 mm 6553 mm 6401 mm 3-1676 mm, 1-1219 mm 6706 mm 6553 mm 3-1676 mm, 1-1524 mm

8858 mm 6706 mm 4-1676 mm 7010 mm 6858 mm 5-1372 mm 7163 mm 7010 mm 4-1372 mm, 1-1542 mm 7315 mm 7163 mm 3-1372 mm, 2-1524 mm

Pieces & Length

Required

#### STANDARD POST SPACING

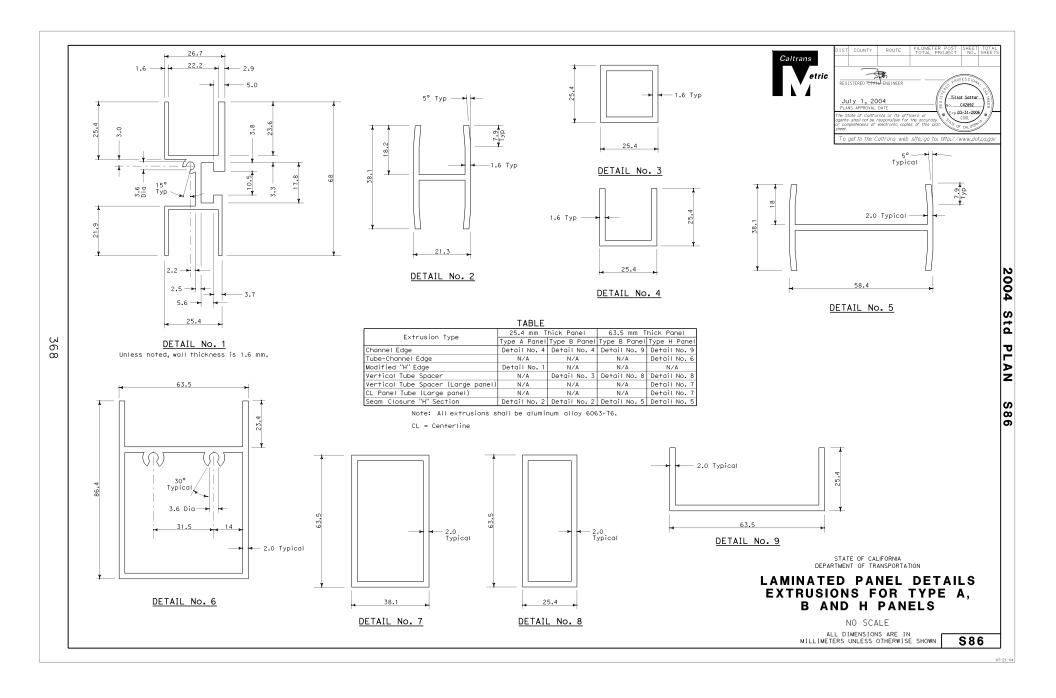
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SEAM CLOSURE. "H" SECTION EXTRUSION AND POST SPACING TABLES **MULTI-HORIZONTAL LAMINATED** PANEL ALUMINUM SIGNS

NO SCALE

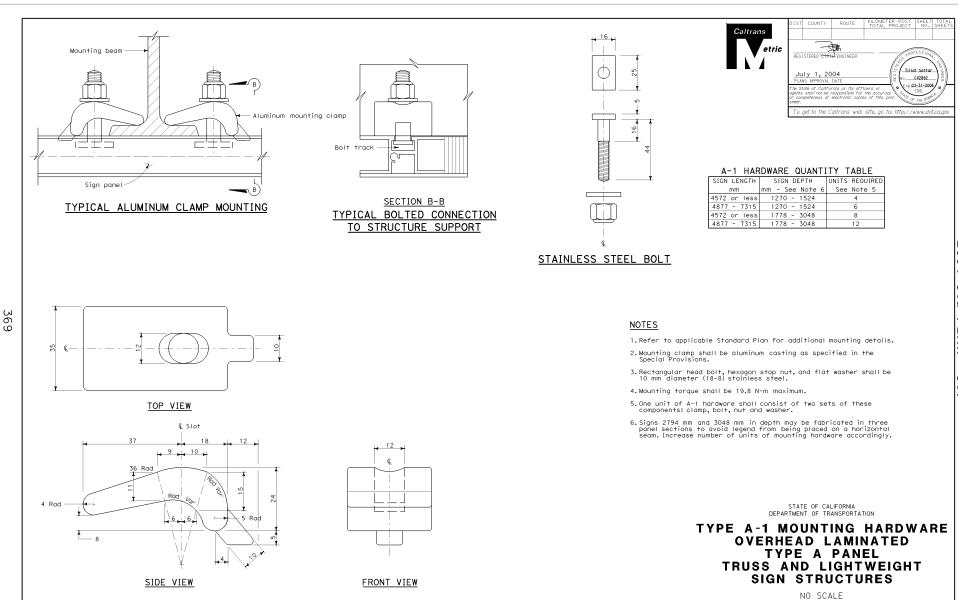
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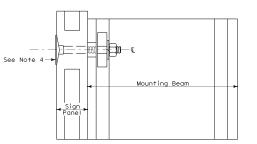


**S87** 

REGISTERED THE ENGINEER Tillat Satta July 1, 2004 C42892 co 03-31-200 The State of California or its officers or

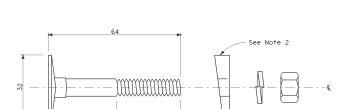
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70

SIDE VIEW



MOUNTING HARDWARE

#### A-2 HARDWARE QUANTITY TABLE

SIGN LENGTH	SIGN DEPTH	UNITS REQUIRED
mm	mm - See Note 3	See Note 5
4267 or less	1270 - 1524	9
4572 - 7315	1270 - 1524	13
6096 - 7315	1270 - 1524	13
4267 or less	1778 - 3048	17
4572 - 7315	1778 - 3048	25
6096 - 7315	1778 - 3048	26

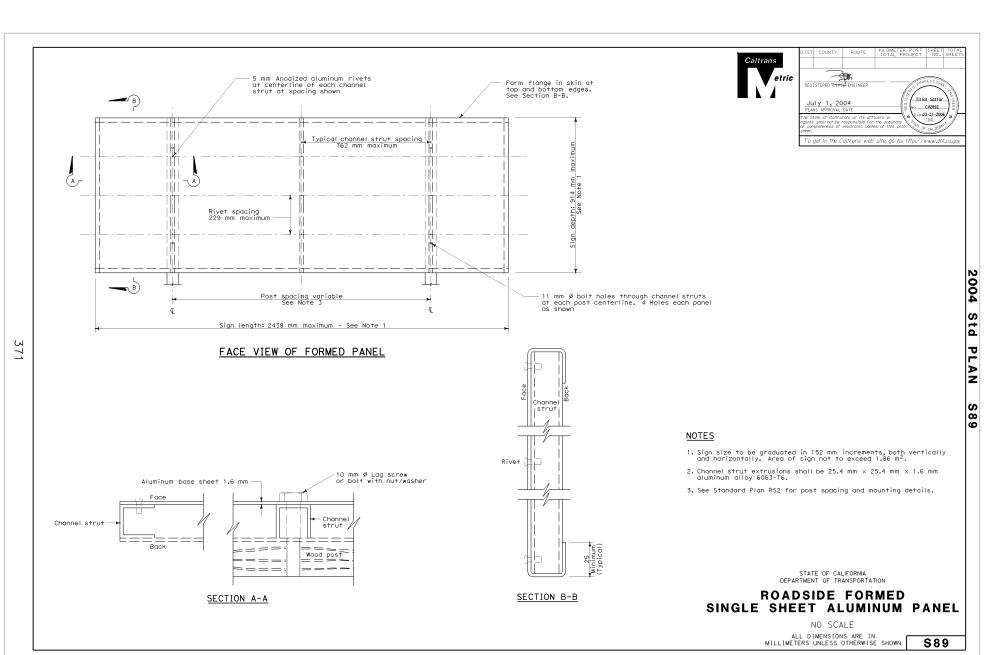
#### NOTES

- 1. Refer to applicable Standard Plan for additional mounting details.
- 2. Beveled washer for flange mounting only.
- 3. Elevator head bolt, hexagon nut, and lock washer shall be 8 mm diameter (18-8) cadmium plated steel.
- 4. Furnish retroflective stick-ons for bolt head in same color as sign. Retroreflective stick-ons are applied at time of installation.
- 5. One unit of A-2 hardware shall consist of one each; bolt nut, washer and beveled washer.
- 6. Signs 2794 mm and 3048 mm in depth may be fabricated in three panel sections to avoid legend from being placed on a horizontal seam. Increase number of units of mounting hardware accordingly.

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TYPE A-2 MOUNTING HARDWARE OVERHEAD LAMINATED TYPE A PANEL BOX BEAM CLOSED TRUSS, **BRIDGE MOUNTED AND** TUBULAR SIGN STRUCTURES

NO SCALE





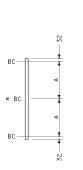


1							TOTAL	No. OF
PANE	L	DIMEN	ISION	DIMEN	ISION	DIMENSION	CHA	NNELS
DEPT	Н	"Δ	."	"E	3"	"D"	PER	PANEL
1270	mm	603	mm		-			3
1524	mm	730	mm		-			3
1778	mm	476	mm	762	mm			4
2032	mm	476	mm	508	mm			5
2286	mm	476	mm	762	mm	508 mm		5
2540	mm	476	mm	762	mm			5
2794	mm	476	mm	508	mm	762 mm		6
3048	mm	476	mm	762	mm	508 mm		6

#### **NOTES**

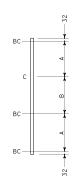
"C" Indicates location of channel.

"BC" Indicated location of bolt and channel.

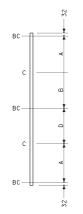




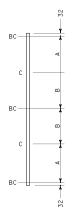
\* This bolt may be omitted when depth is 1270 mm.



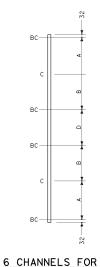
4 CHANNELS FOR 1778 mm DEPTH



5 CHANNELS FOR 2286 mm DEPTH



5 CHANNELS FOR 2032 mm AND 2540 mm DEPTH



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

2794 mm AND

3048 mm DEPTH

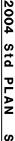
#### CHANNEL AND BOLT HOLE LOCATION OVERHEAD FORMED SIGN PANEL

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S90** 

2004 Std PLAN



Tillat Sattar

C42892 p 03-31-2006

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STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Caltrans

July 1, 2004

NUMBER OF UNITS

REQUIRED

8

12

16

20

24

28

32

36

40

44

48

12

18

24

30

36

42

48

54

60

66

72

16 24

32

40 48

56

64

80

88

MOUNTING HARDWARE QUANTITY CHART

SIGN DEPTH

1270 mm

1524 mm - 2540 mm

2794 mm - 3048 mm

1 Truss head bolt, 1 Nylon insert locknut, 1 washer (Fiber/Nylon), 1 washer (Aluminum)

- 2540 mm

1524 mm

2794 mm

2794 mm

11 582 mm - 12 192 mm 1524 mm - 2540 mm

12 802 mm - 13 411 mm 1524 mm - 2540 mm

10 363 mm - 10 973 mm 2794 mm - 3048 mm 11 582 mm - 12 192 mm 2794 mm - 3048 mm

12 802 mm - 13 411 mm 2794 mm - 3048 mm

14 021 mm - 14 630 mm 2794 mm - 3048 mm

SIGN LENGTH

2438 mm

3048 mm - 3657 mm

4267 mm - 4877 mm

5486 mm - 6096 mm

6706 mm - 7315 mm

7925 mm - 8534 mm

9144 mm - 9754 mm

IO 363 mm - 10 973 mm

11 582 mm - 12 192 mm

12 802 mm - 13 411 mm

14 021 mm - 14 630 mm

2438 mm

3048 mm - 3657 mm

4267 mm - 4877 mm

5486 mm - 6096 mm

6706 mm - 7315 mm

7925 mm - 8534 mm

9144 mm - 9754 mm

IO 363 mm - 10 973 mm

14 021 mm - 14 630 mm

2438 mm

3048 mm - 3657 mm

4267 mm - 4877 mm

5486 mm - 6096 mm

6706 mm - 7315 mm

7925 mm - 8534 mm

9144 mm - 9754 mm

#### OVERHEAD FORMED SIGN PANEL TYPE A-3 MOUNTING **HARDWARE**

NO SCALE ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S91** 

Phillips recess in head

W

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TRUSS HEAD BOLT

2024 Aluminum alloy per 00-A-430 Anodize interstate green per MIL-A-8625

LOCKNUT WITH NYLON INSERT 2911-T3 Aluminum alloy or equivalent Anodize per MIL-A-8625 Maximum torque - 6.8 N-m

Clear anodize per MIL-A-8625

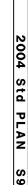
WASHER 2024 Aluminum alloy

**WASHER** 

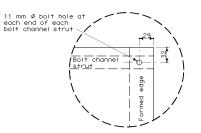
Fiber/Nylon

10 mm-16 UNC-2A

10 mm - 16 CL-2B -







See "TYPICAL BOLT HOLE DETAIL"

Rivet at each end of each channel strut

Formed edge at left and right edge of panel

1156

Bolt hole spacing

Panel length: 1214 mm for 1220 mm panel 605 mm for 610 mm panel

FACE VIEW OF FORMED PANEL
Single panel shown

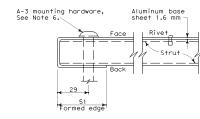
Rivet at centerline of each strut at spacing shown —

BC --- -

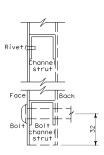
Typical rivet spacing

74

#### TYPICAL BOLT HOLE DETAIL



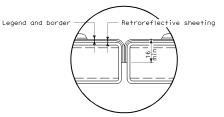
SECTION A-A



SECTION B-B

### NOTES

- 1. "BC" indicates centerline of bolt channel strut.
  "C" indicates centerline of channel strut.
- 2. See Standard Plan S90 for location and configuration of struts.
- 3. Bolt channel and channel extrusions shall be 25.4 mm  $\times$  25.4 mm  $\times$  1.6 mm aluminum alloy 6063-T6.
- 4. All rivets shall be 5 mm in diameter and anodized aluminum.
- 5. See Standard Plan S8B for mounting details.
- 6. See Standard Plan S91 for A-3 mounting hardware.



RETROREFLECTIVE SHEETING OVERLAP
ON INTERIOR EDGES

Two panels shown

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#### OVERHEAD FORMED SIGN PANEL

NO SCALE

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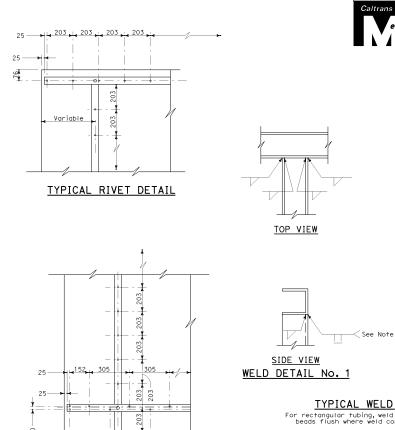
		CHANNEL	SIZES			
		PANEL	No. OF	No. OF	HORZ.	VERT.
SIGN LENGTH	SIGN DEPTH	THICKNESS	HORIZONTAL	VERTICAL	MEMBER	MEMBER
(mm)	(mm)	(mm)	MEMBERS	MEMBERS	TYPE	TYPE
Up to 1194		1.6	No frame	required		
1219 to 1397		2.0	No frame	required		
1422 to 1778	305 to 610	1.6	2		A	
	635 to 914	1.6	2	2	A	Α
	940 to 1219	1.6	2	3	А	Α
	1245 to 2438	1.6	3	3	В	Α
1829 to 1981	305 to 610	1.6	2		A	
	635 to 914	1.6	2	2	A	А
	940 to 1219	1.6	2	3	А	Α
	1245 to 1829	1.6	3	3	В	В
	1854 to 2438	1.6	3	3	С	С
2032 to 2286	457 to 1219	2.0	2	3	В	В
	1245 to 1829	2.0	3	3	В	В
	1854 to 2438	2.0	3	3	С	С
2337 to 2591	457 to 1219	2.0	2	3	В	В
	1245 to 2438	2.0	3	3	С	С
2642 to 2896	457 to 1219	2.0	2	3	В	В
	1245 to 2438	2.0	3	3	С	С
2946 to 3353	457 to 1219	2.0	2	3	С	С
	1245 to 2438	2.0	3	3	С	С
	2464 to 3353	2.0	4	4	С	С

#### <u>NOTE</u>

- Type A 31.8 mm  $\times$  31.8 mm  $\times$  3.2 mm Channel to be aluminum alloy 6063-T5. \* Type B 60.3 mm  $\times$  31.8 mm  $\times$  4.8 mm Channel to be aluminum alloy 6063-T6. \* Type C 50.8 mm  $\times$  50.8 mm Channel to be aluminum alloy 6063-T6.
- \* 44.5 mm  $\times$  38.1 mm  $\times$  3.2 mm Rectangular tubing aluminum alloy 6063-T6 may be substituted for Types B and B, but more than one type of framing material used on one sign is unacceptable.

#### POST SPACING

SIGN LE	NGTH	CENTERLINE SPACING
(mm	)	(mm)
1422 to	1727	1067
1778 to	2032	1219
2083 to	2337	1372
2388 to	2489	1524
2540 to	2642	1575
2692 to	2794	1626
2845 to	2946	1727
2997 to	3099	1829
3150 to	3302	1981
3327 to	3353	2134



305

RIVET DETAIL AT SPLICE

305

#### TYPICAL WELD DETAILS

For rectangular tubing, weld all around and grind beads flush where weld contacts sign panel.

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DEPARTMENT OF TRANSPORTATION

#### FRAMING DETAILS FOR FRAMED SINGLE SHEET **ALUMINUM SIGNS** RECTANGULAR SHAPE

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S93** 

Tillat Sattar C42892

p 03-31-2006

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TOP VIEW

SIDE VIEW

WELD DETAIL No. 2

2004 Std

PL

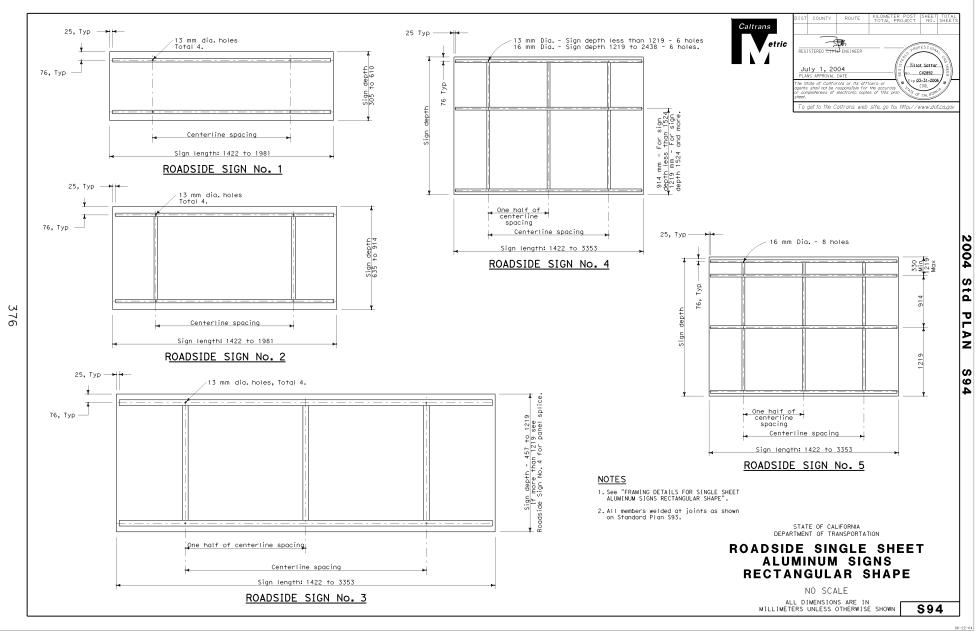
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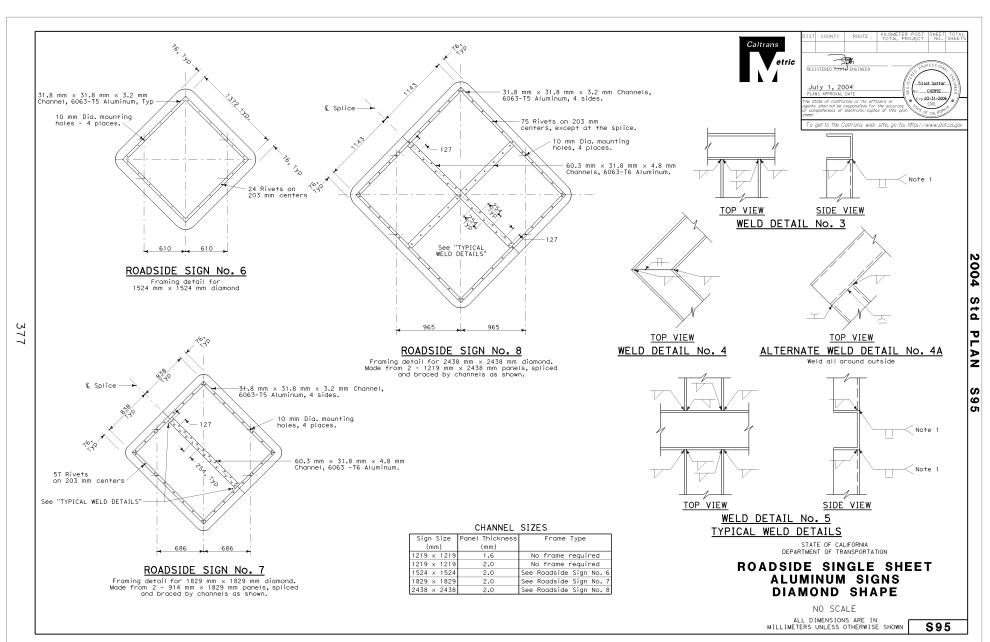
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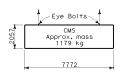
See Note



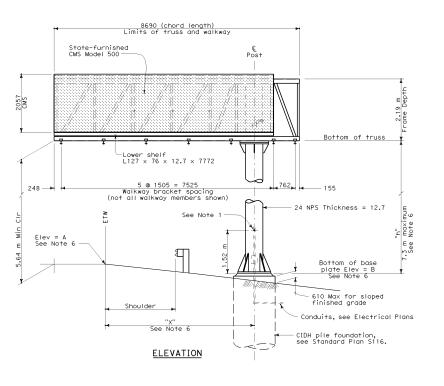








LIFTING DIAGRAM



PLAN

State-furnished CMS Model 500 —

78

Backside walkway (Project specific, see Project Plans).

#### NOTES

- 1. Drill and tap for Size 63 recessed pipe plug.
- 2. Changeable Message Sign will be State-furnished.
- 3. For location and elevation of sign structure see Project Plans.
- 4. Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
- At final position of post top and bottom nuts shall be tightened against base plate.
- 6. See Project Plans.

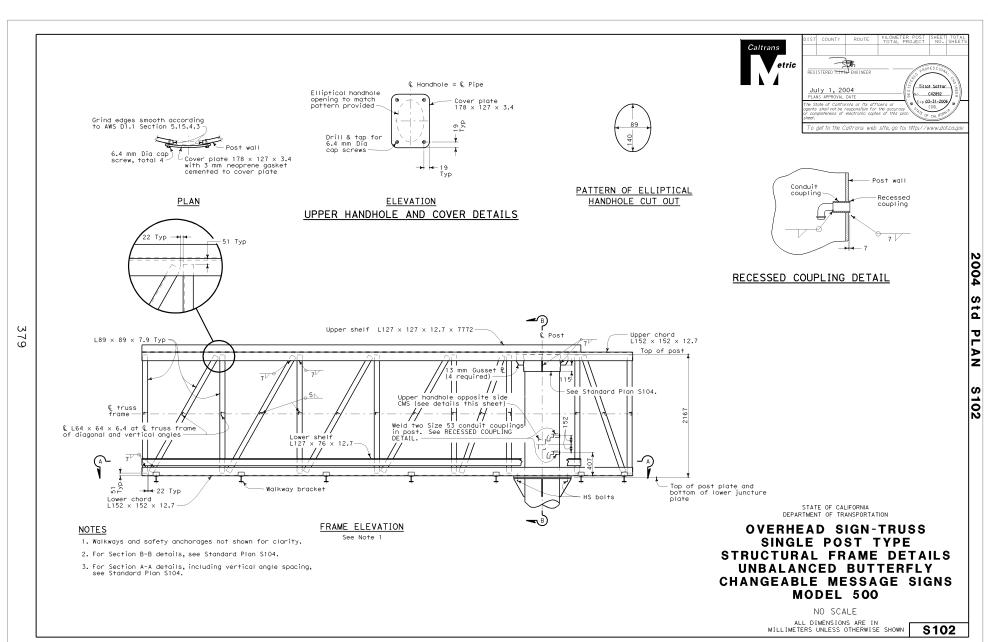
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

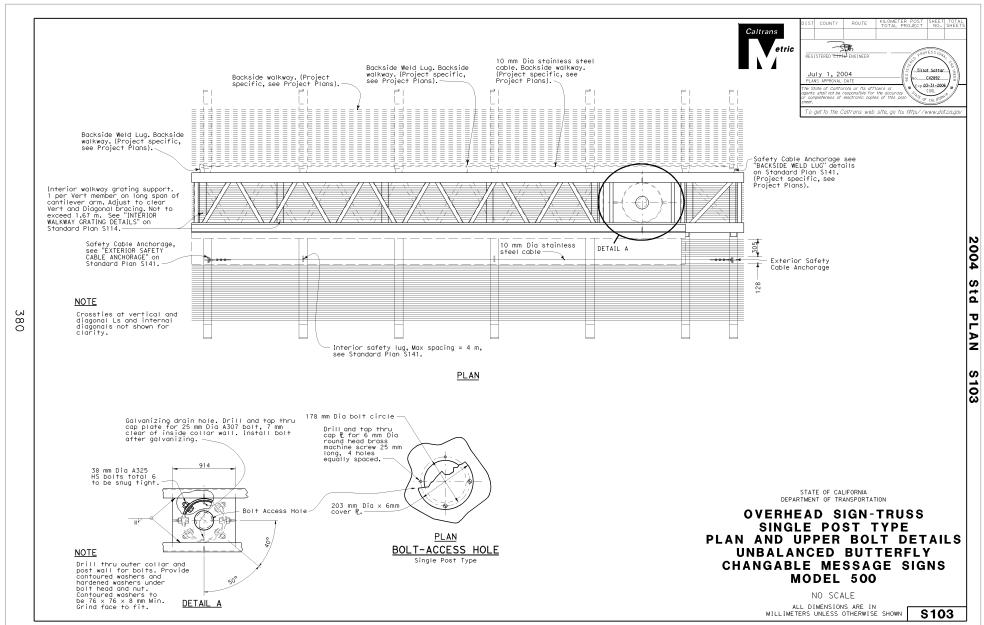
OVERHEAD SIGN-TRUSS
SINGLE POST TYPE
LAYOUT
UNBALANCED BUTTERFLY
CHANGEABLE MESSAGE SIGNS
MODEL 500

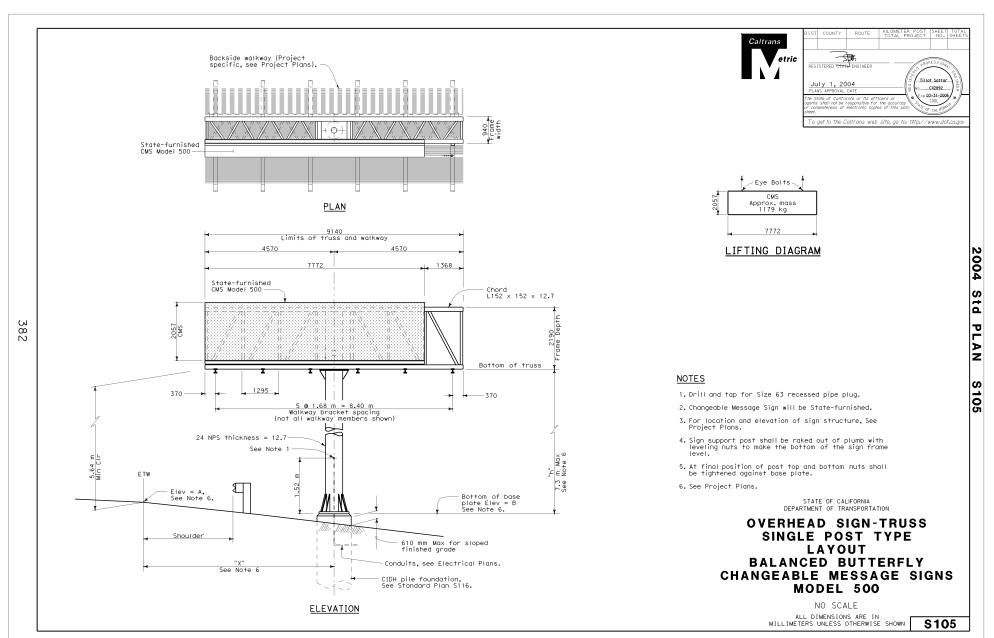
NO SCALE

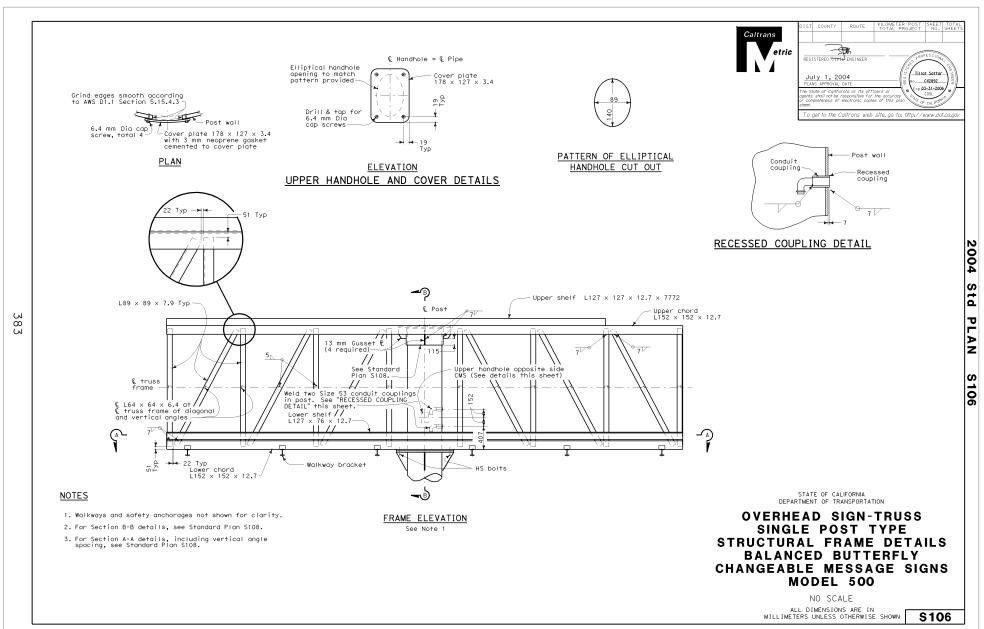
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

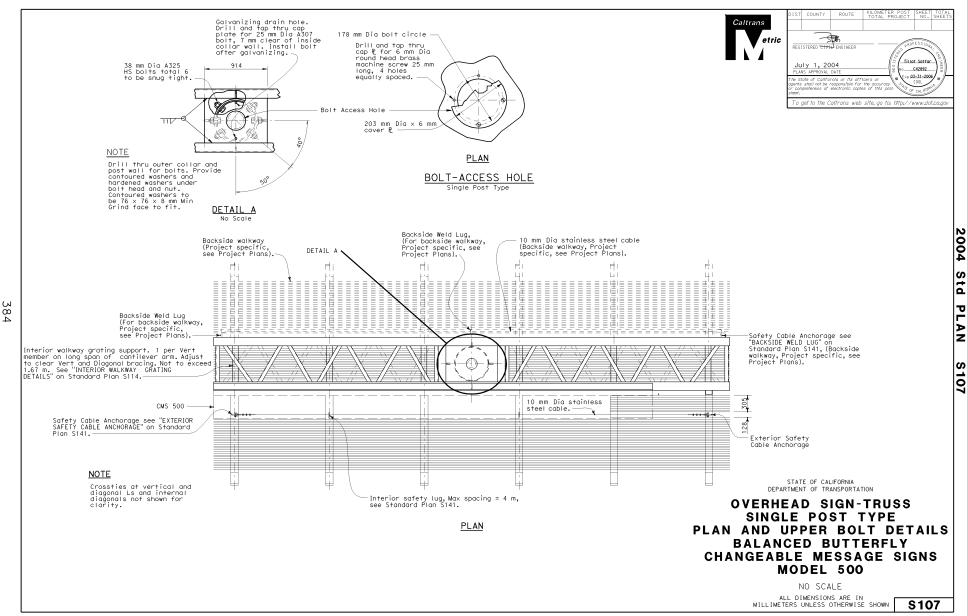
S101

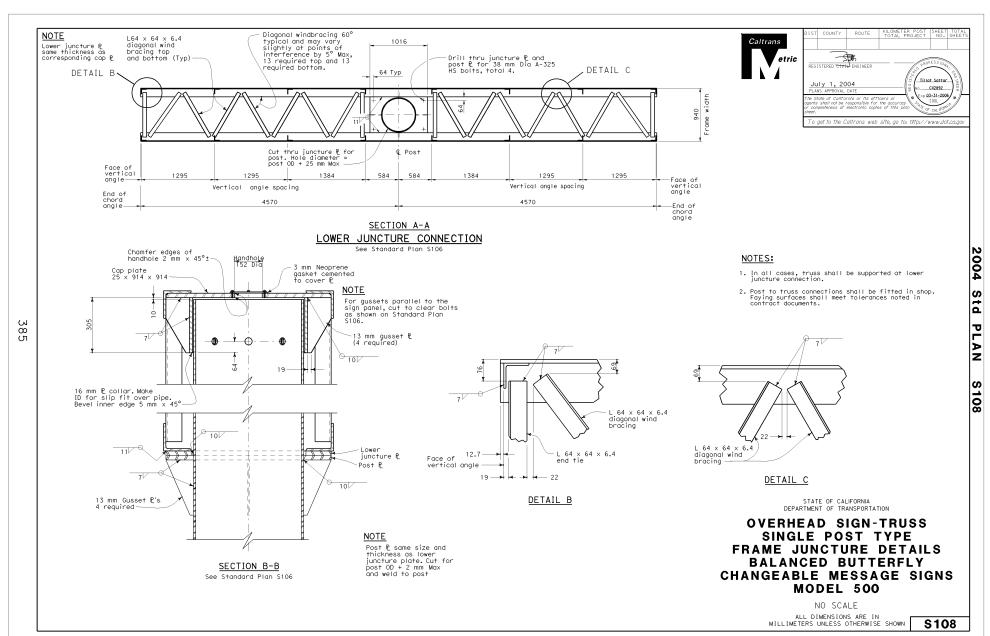


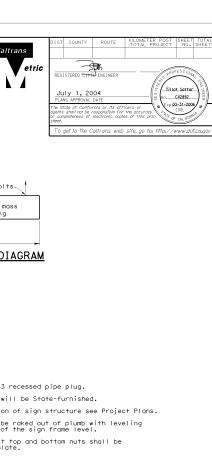


















Backside walkway (Project specific, see Project Plans).

Bottom of truss

Bottom of base

plate Elev = B See Note 6

-610 Max for sloped

Conduits, see Electrical Plans

finished grade

CIDH pile foundation, see Standard Plan S116.

24 NPS Thickness = 12.7

682

Post @

State-furnished CMS Model 500 —

86

<u>PLAN</u>

7772 Limits of truss and walkway

7090

4 @ 1505 = 6020

Walkway bracket spacing (not all walkway members shown)

Shoulder

 $\Box$ 

See Note 6

**ELEVATION** 

State-furnished CMS Model 500 —

248

 $\frac{\text{Elev} = A}{\text{See Note 6}}$ 

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### **NOTES**

- 1. Drill and tap for Size 63 recessed pipe plug.
- 2. Changeable Message Sign will be State-furnished.
- 3. For location and elevation of sign structure see Project Plans.
- 4. Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
- At final position of post top and bottom nuts shall be tightened against base plate.
- 6. See Project Plans.

STATE OF CALIFORNIA

**OVERHEAD SIGN-TRUSS** SINGLE POST TYPE LAYOUT **FULL CANTILEVER** CHANGEABLE MESSAGE SIGNS MODEL 500

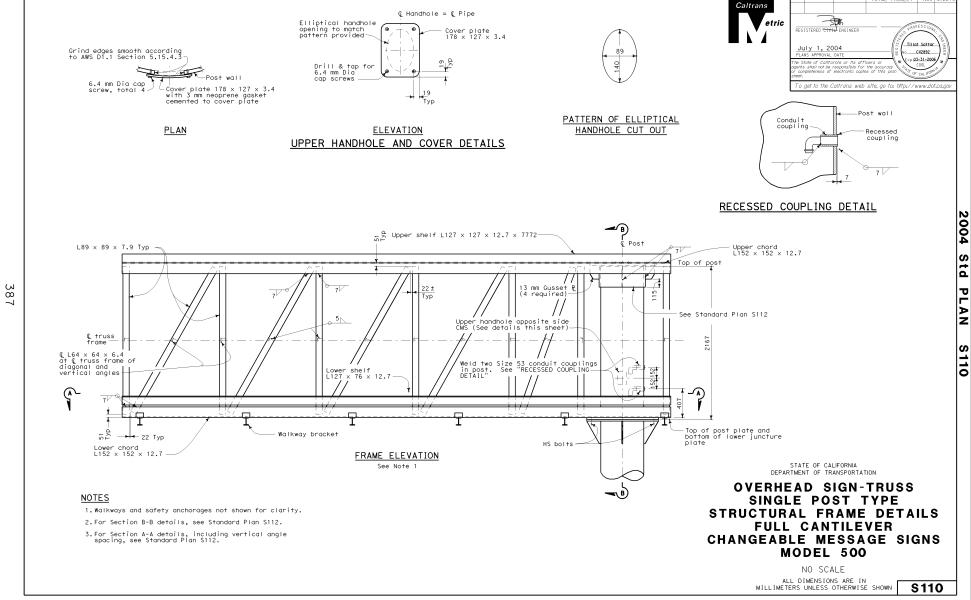
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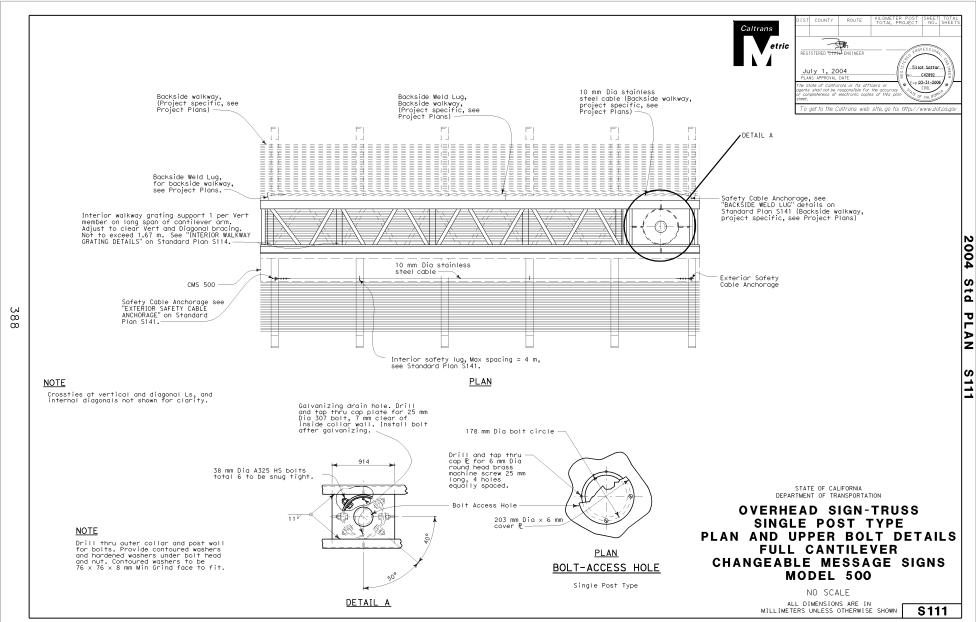
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

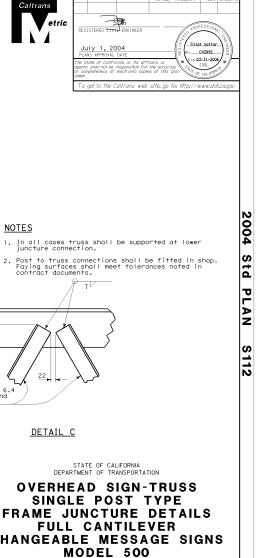
**S109** 

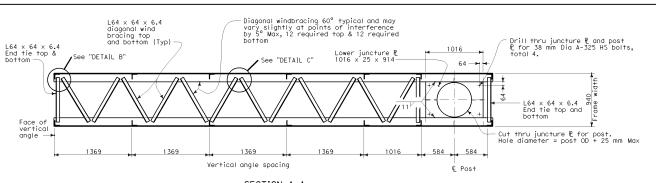
2004 Std PLAN

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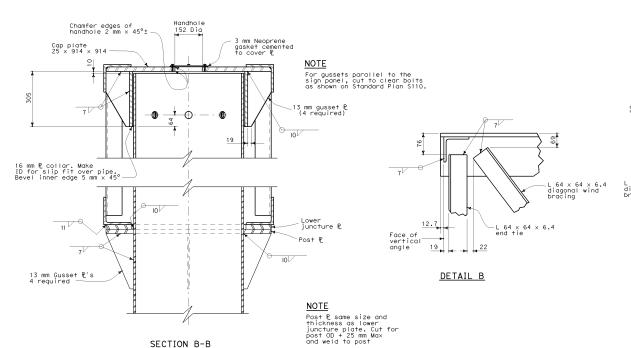
### SECTION A-A LOWER JUNCTURE CONNECTION

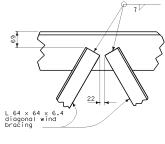
See Standard Plan S110

SECTION B-B

See Standard Plan SIIO

38

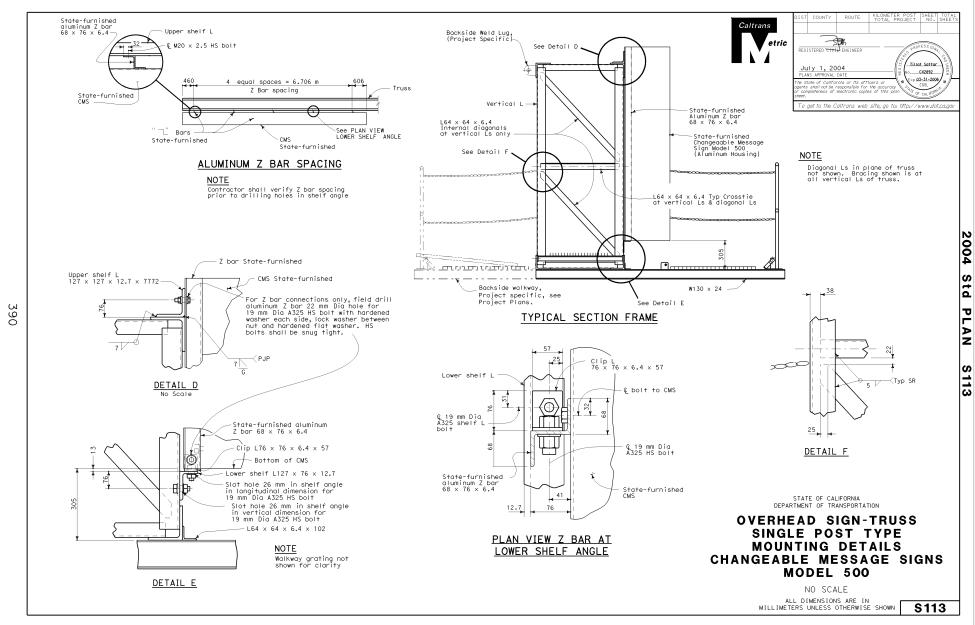


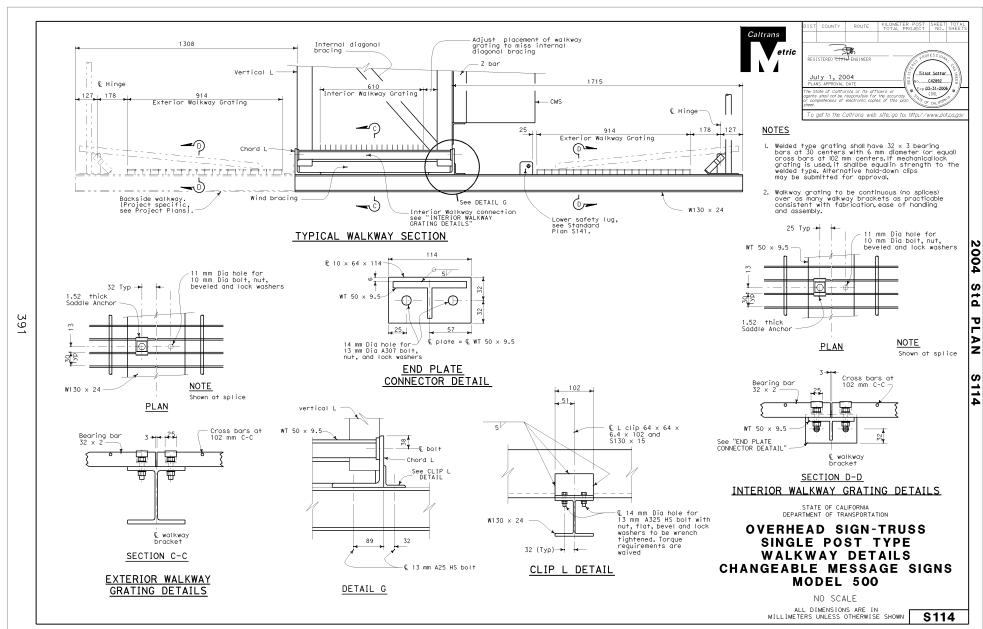


FRAME JUNCTURE DETAILS CHANGEABLE MESSAGE SIGNS

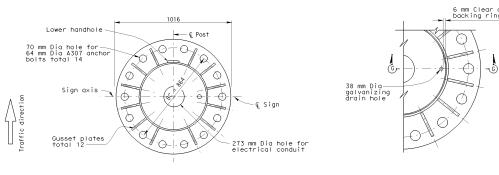
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ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



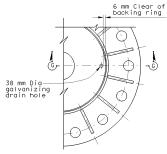




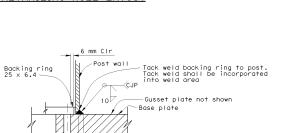


### 14 BOLTS BASE PLATE DETAILS

92



### GALVANIZING HOLE LAYOUT





### NOTES

- Thread upper 254 mm and galvanize upper 305 mm of the anchor bolts.
- 2. Provide bolt template during installation of anchor bolts.

Caltrans

- 3. Following initial tightening. Upper nuts shall be brought to a snug tight condition. This can be obtained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Snug tightening shall progress systematically according to the tightening sequence as shown. Upper nuts and washers to have full even bearing on base plate.
- 4. 64 mm Dia anchor bolts with nut, leveling nut and 3 flat washers per bolt. Leveling nuts and washers to be adjusted for full even bearing on base plate prior to final tightening of upper nuts. (See note 3)

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ROUTE

get to the Caltrans web site, go to: http://www.dot.ca.g

Tillat Satta

Sign axis

C42892 co 03-31-200

REGISTERED CIVIL ENGINEER

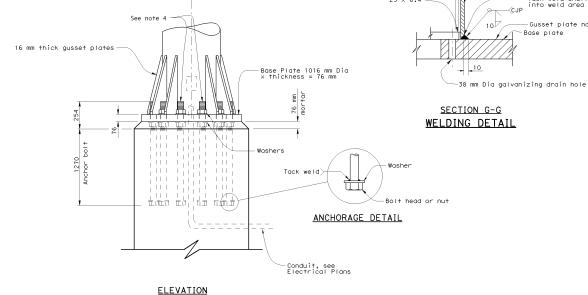
he State of California or its officers or

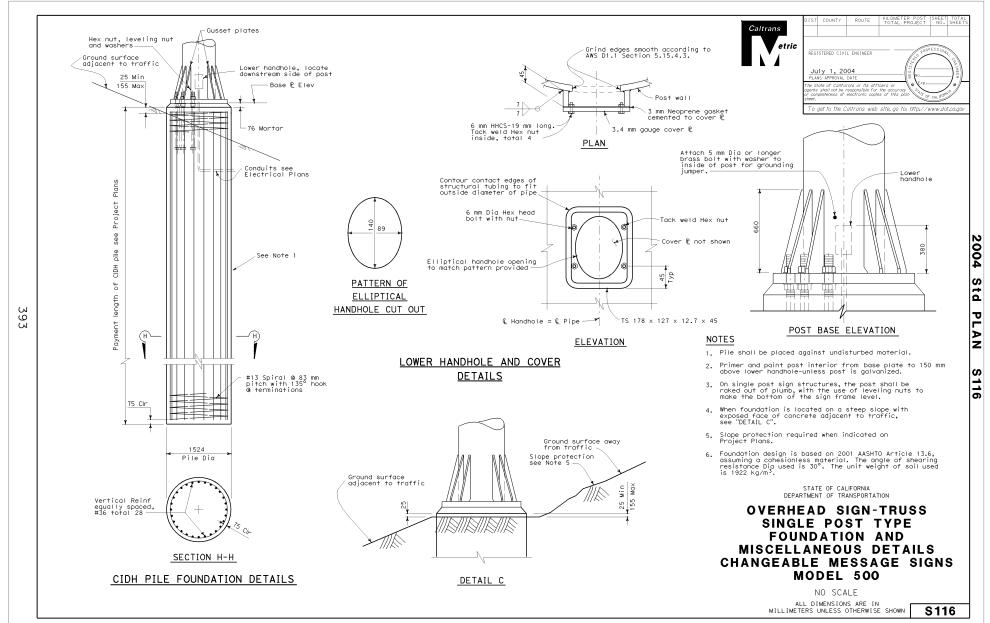
July 1, 2004

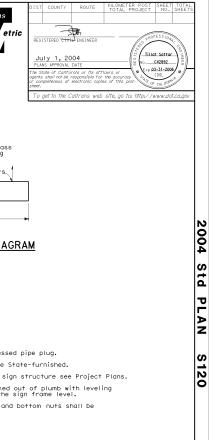
**OVERHEAD SIGN-TRUSS** SINGLE POST TYPE ANCHORAGE AND BASE PLATE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN









CMS Approx mass 1088 kg \_Eye Bolts 5842

### LIFTING DIAGRAM

### **NOTES**

The Backside walkway is (Project specific, See Project Plans

**PLAN** 6756

Limits of truss and walkway

Walkway bracket spacing (not all walkway members shown)

"X"

(See Note 6)

€ Post

**ELEVATION** 

Bottom of truss

See 3

18 NPS -Thickness = 12.7

Bottom of base plate Elev = B

-610 Max for sloped finished grade

Conduits, see Electrical Plans

-CIDH pile foundation see Standard Plans S135

State-furnished CMS Model 510

State-furnished CMS Model 510

394

365 CMS

279-▶

Elev = A (See Note 6)

m Min CIr

1371

Shoulder

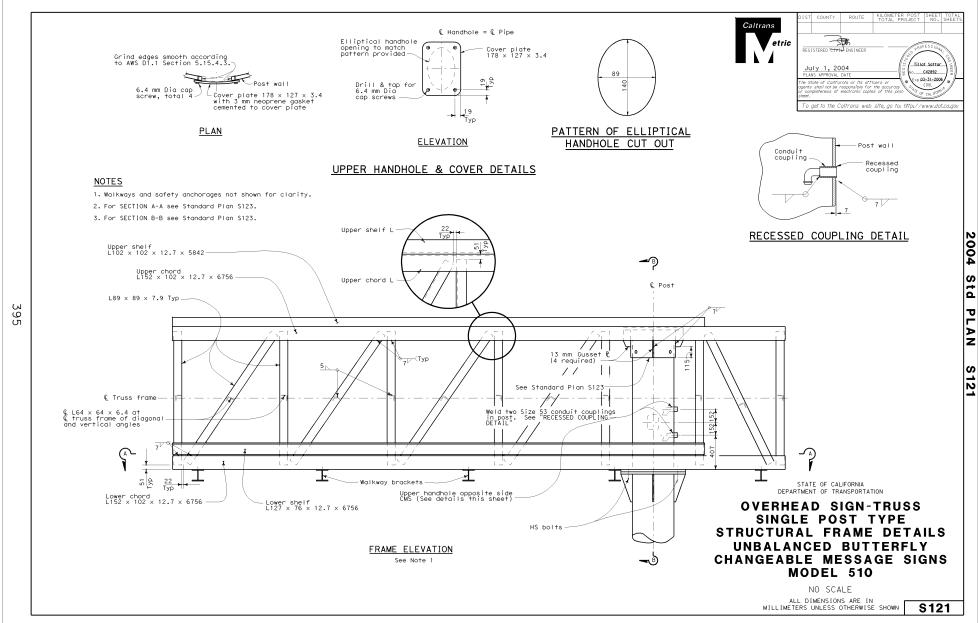
- 1. Drill and tap for Size 63 recessed pipe plug.
- 2. Changeable Message Sign will be State-furnished.
- 3. For location and elevation of sign structure see Project Plans.
- Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
- At final position of post top and bottom nuts shall be tightened against base plate.
- 6. See Project Plans.

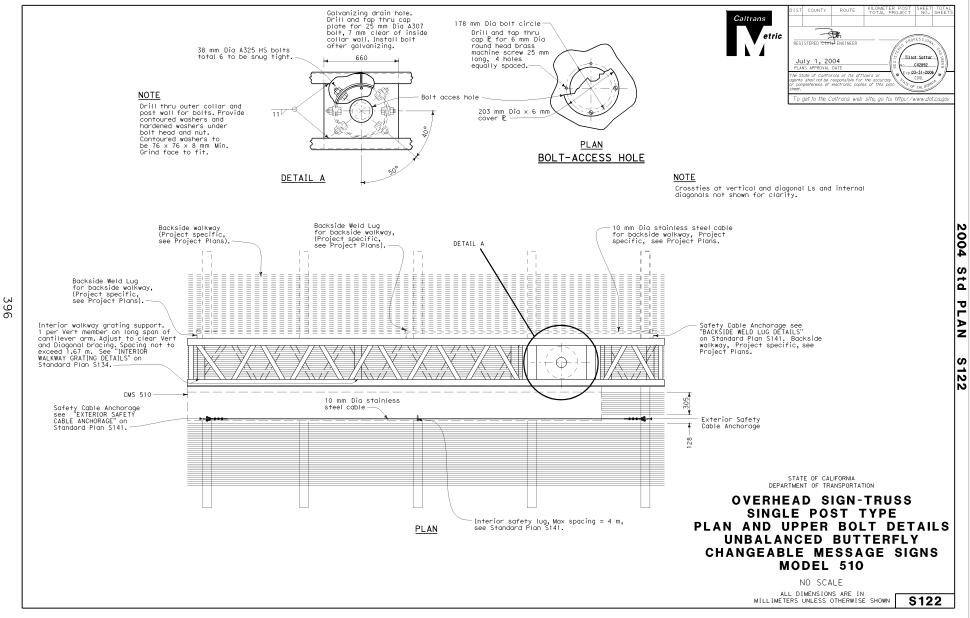
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

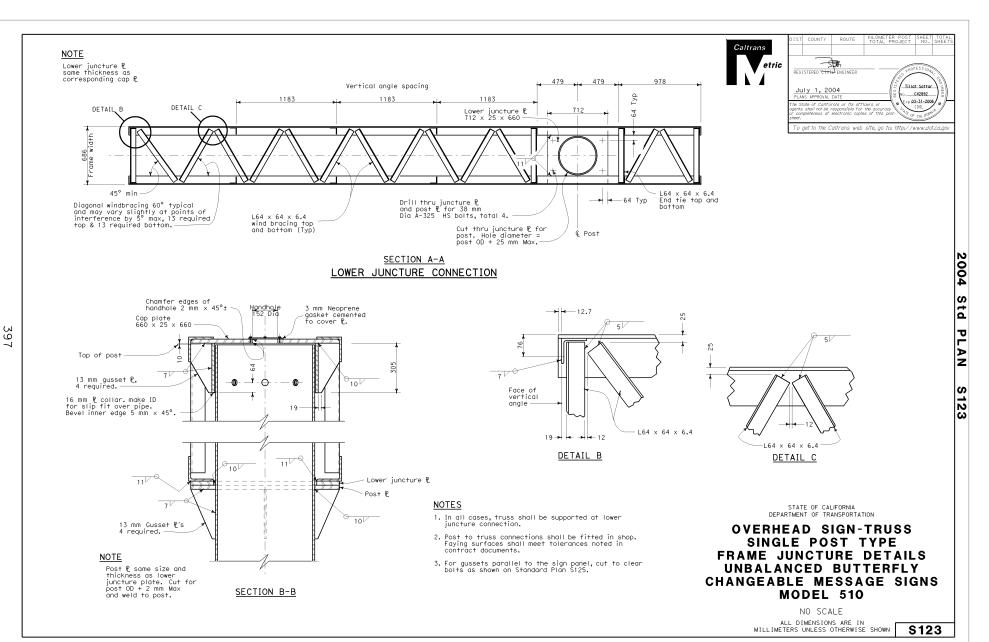
**OVERHEAD SIGN-TRUSS** SINGLE POST TYPE LAYOUT UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 510

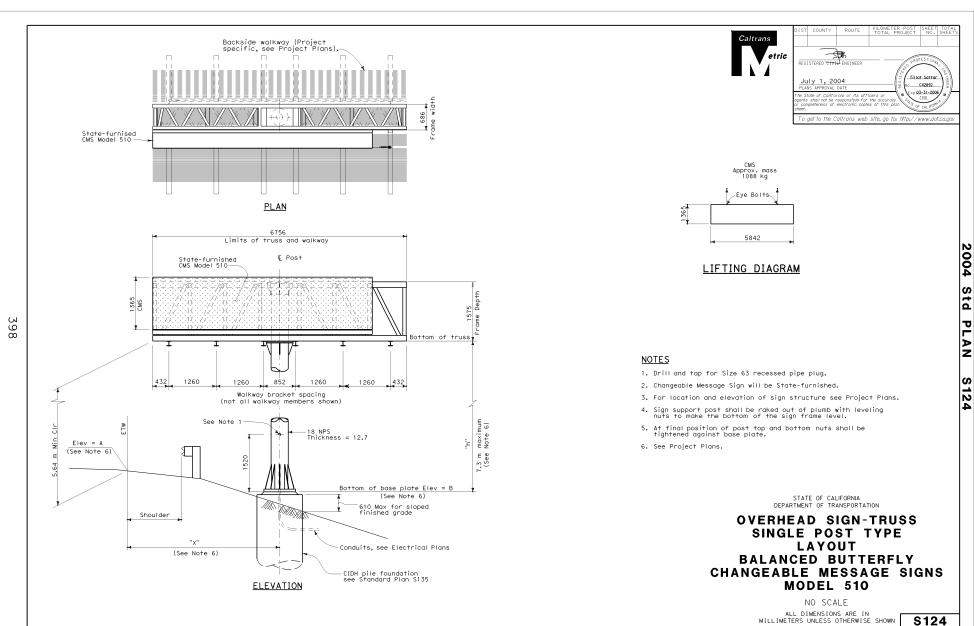
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

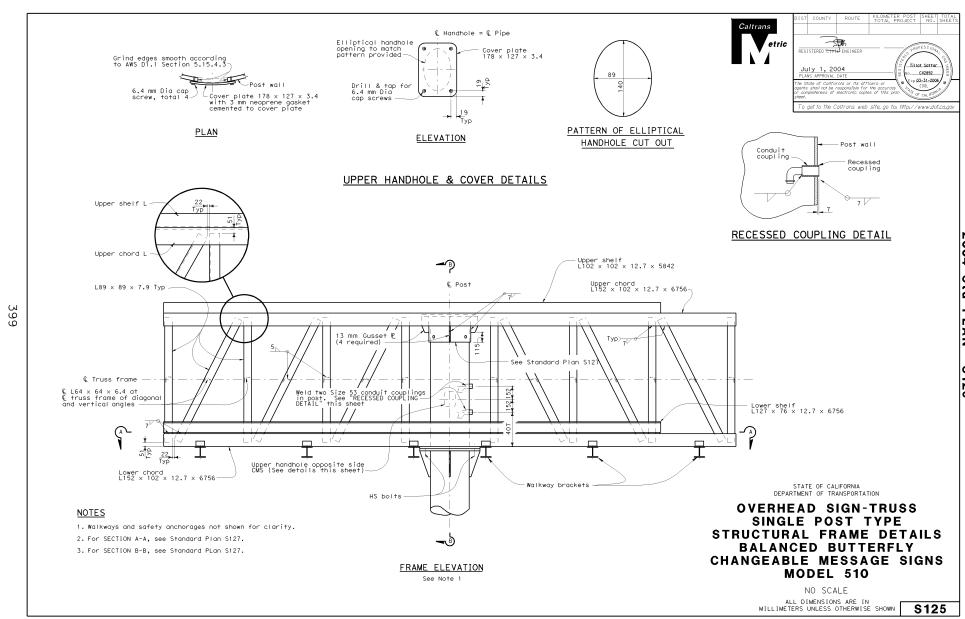


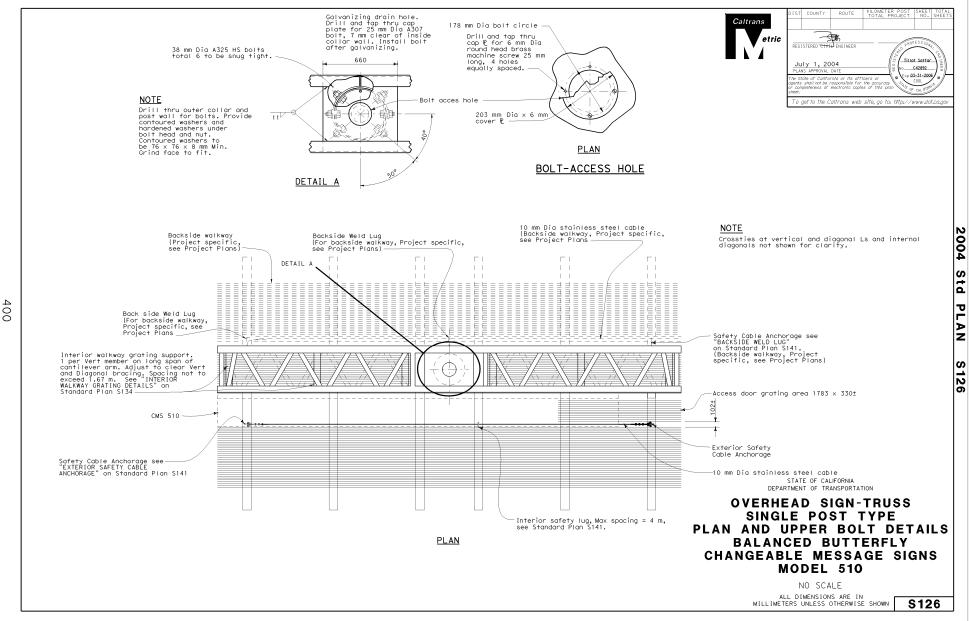


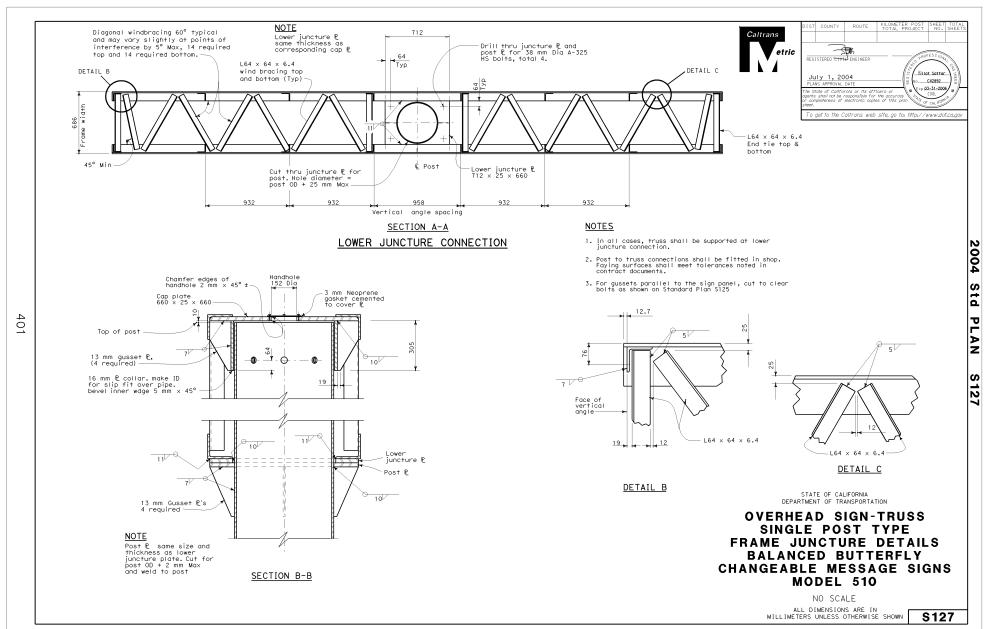


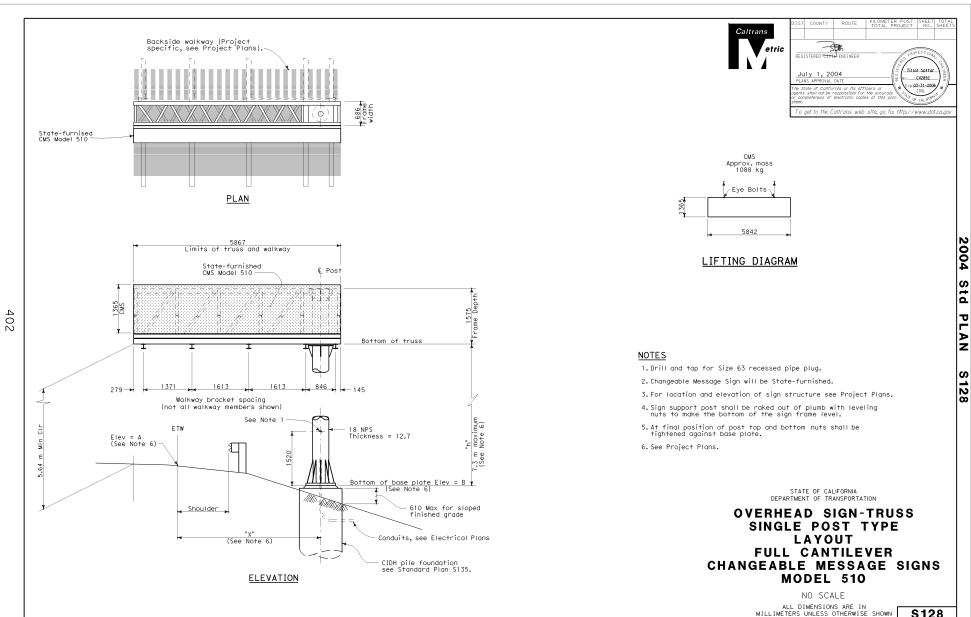


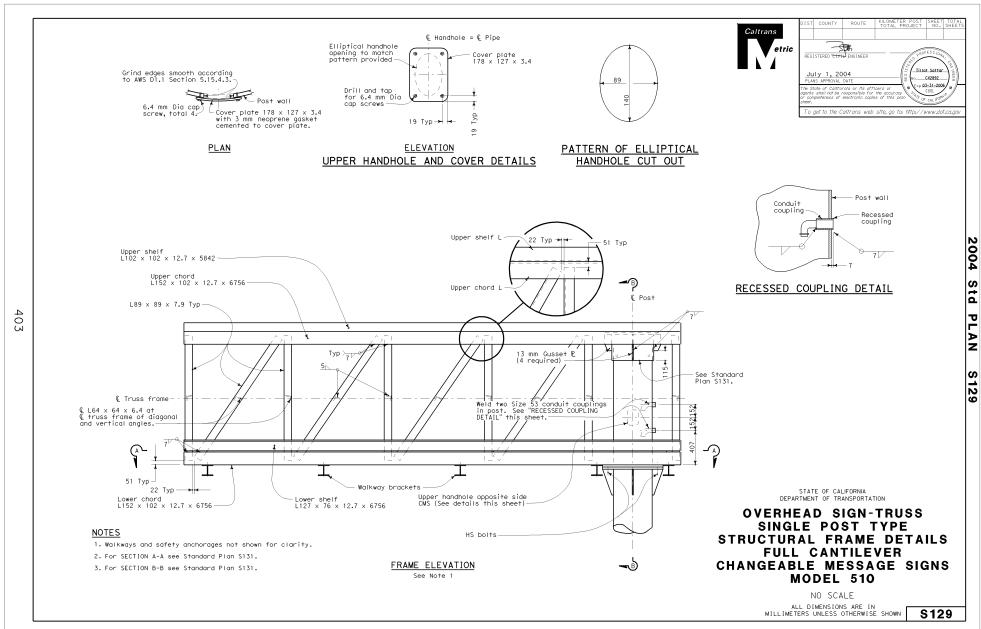


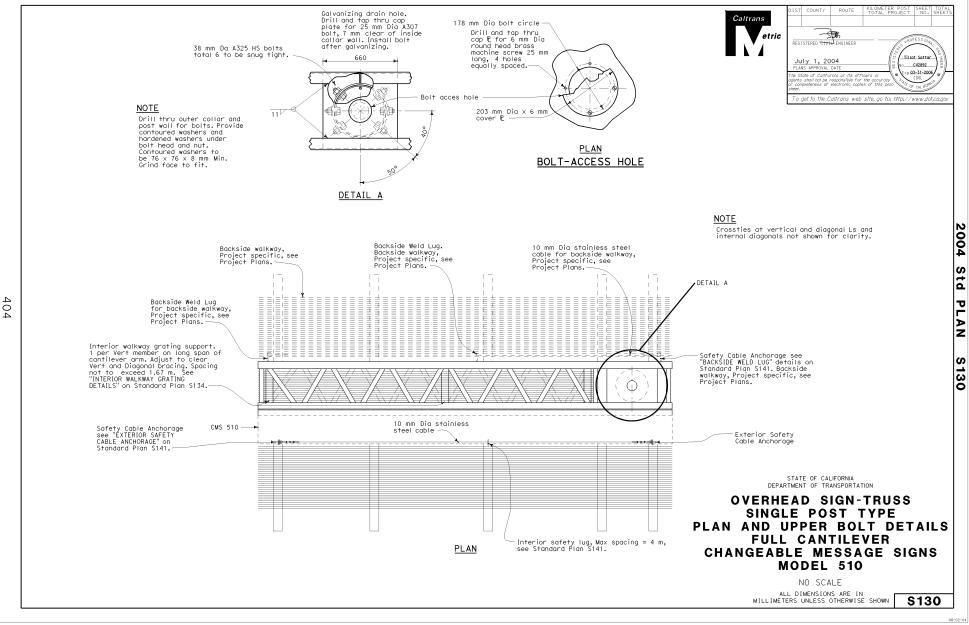




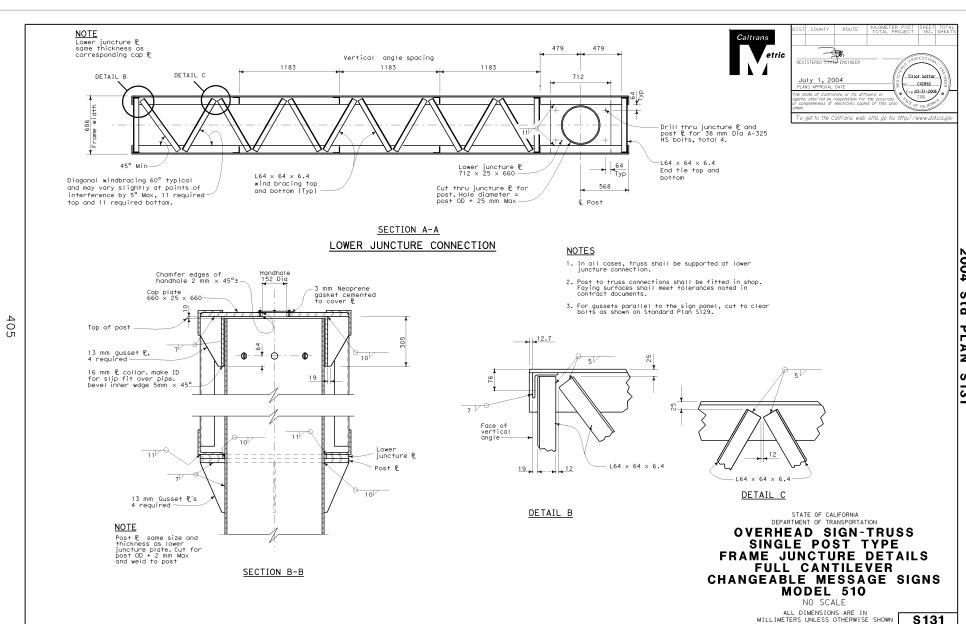


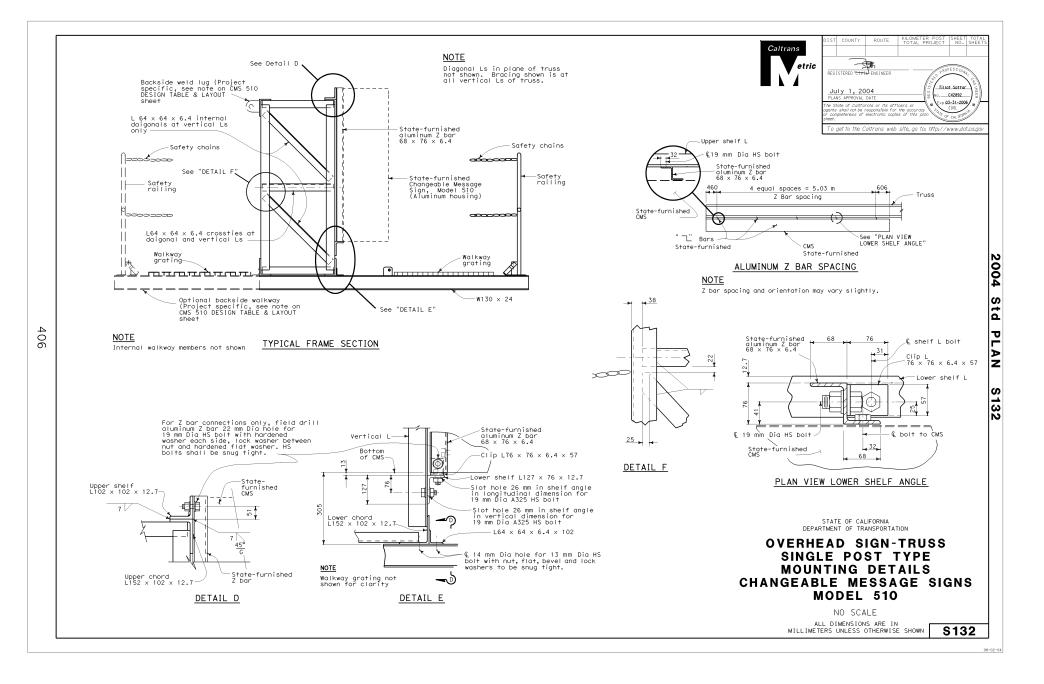


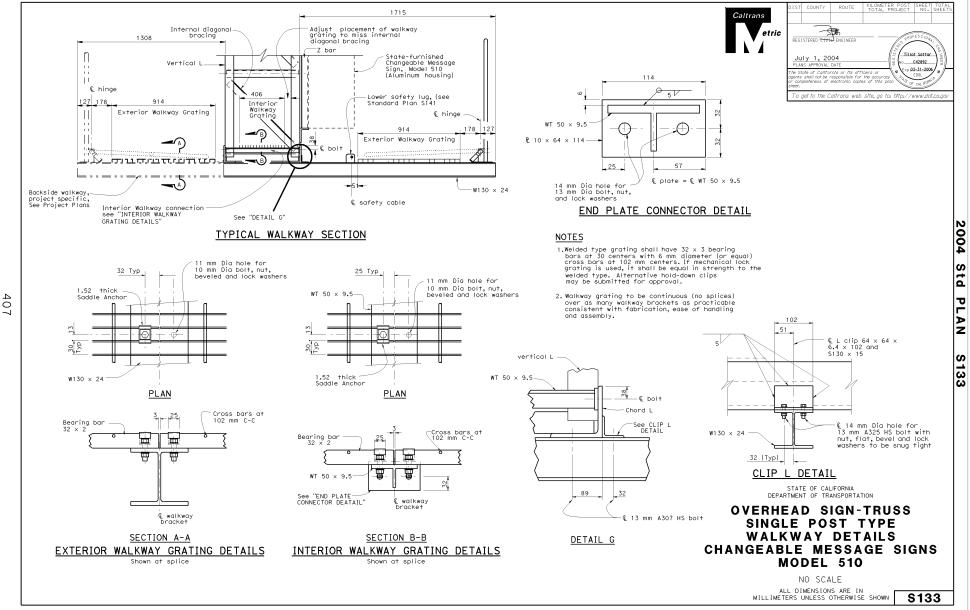


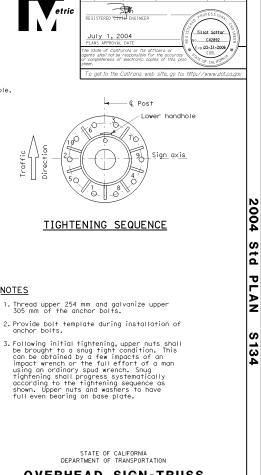












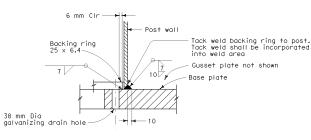
ROUTE

Caltrans

**NOTES** 



## GALVANIZING HOLE LAYOUT



## SECTION G-G

3. Following initial tightening, upper nuts shall be brought to a snug tight condition. This can be obtained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Snug tightening shall progress systematically according to the tightening sequence as shown. Upper nuts and washers to have full even bearing on base plate.

SINGLE POST TYPE ANCHORAGE AND BASE PLATE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 510

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**S134** 

57 mm Dia anchor bolts with

nut, leveling nut and 3 flat washers per bolt. Leveling nuts

1270 Anchor bolt

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0

washers per both. Leveling hurs and washers to be adjusted for full even bearing on base plate prior to final tightening of upper nuts. See Note 3. 16 mm thick gusset plate.

813

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Θ.

10 BOLTS BASE PLATE DETAILS

Lower handhole

63 mm Dia hole for 57 mm Dia

anchor bolts, total 10.

- Hammer peen weld toes at gussets, total 9.

273 mm Ø Hole for

electrical conduit

€ Post-

<u>Sign ax</u>is

Gusset plates, total 9.

Base plate 813 mm Dia x thickness = 70 mm.

**ELEVATION** 

Tack weld Washer

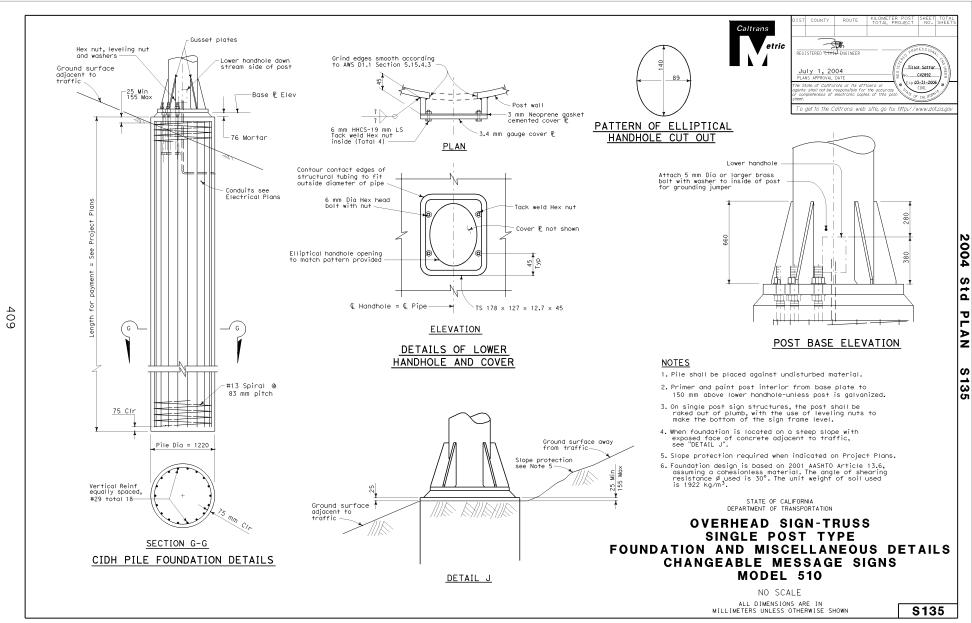
Conduit, see Electrical Plans.

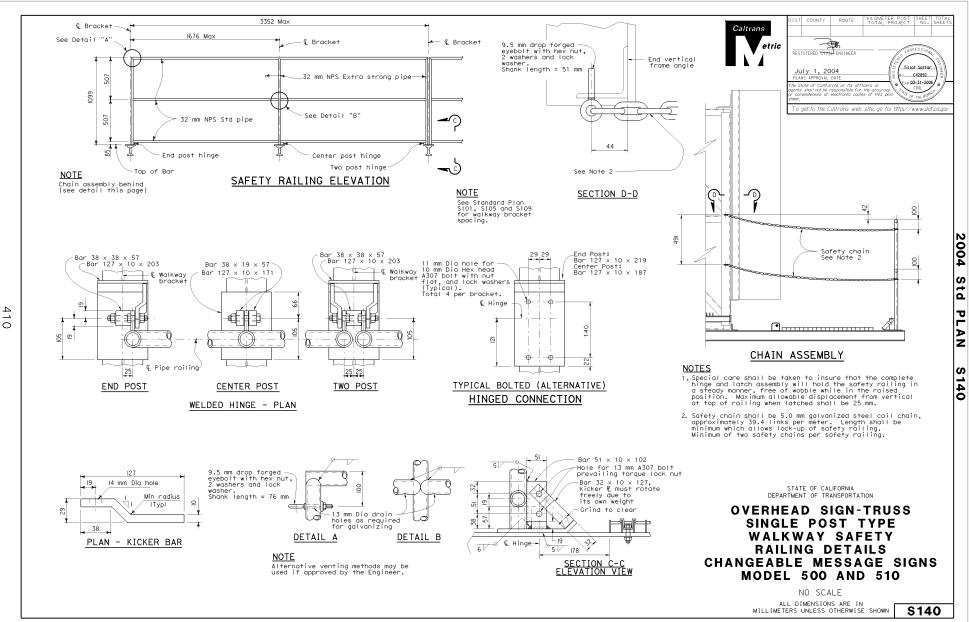
WELDING DETAIL

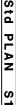
Bolt head or nut

ANCHORAGE DETAIL

**OVERHEAD SIGN-TRUSS** 











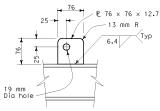
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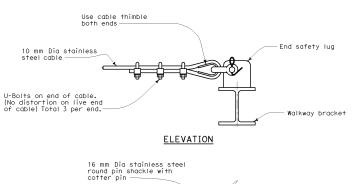
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See "INTERIOR SAFETY LUG DETAIL" for lug dimensions and hole. Тур

END SAFETY LUG DETAIL



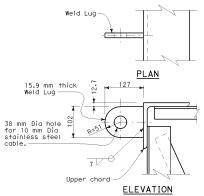
INTERIOR SAFETY LUG DETAIL



 $\rightarrow$ 

Walkway bracket

<u>PLAN</u> END VIEW SAFETY CABLE



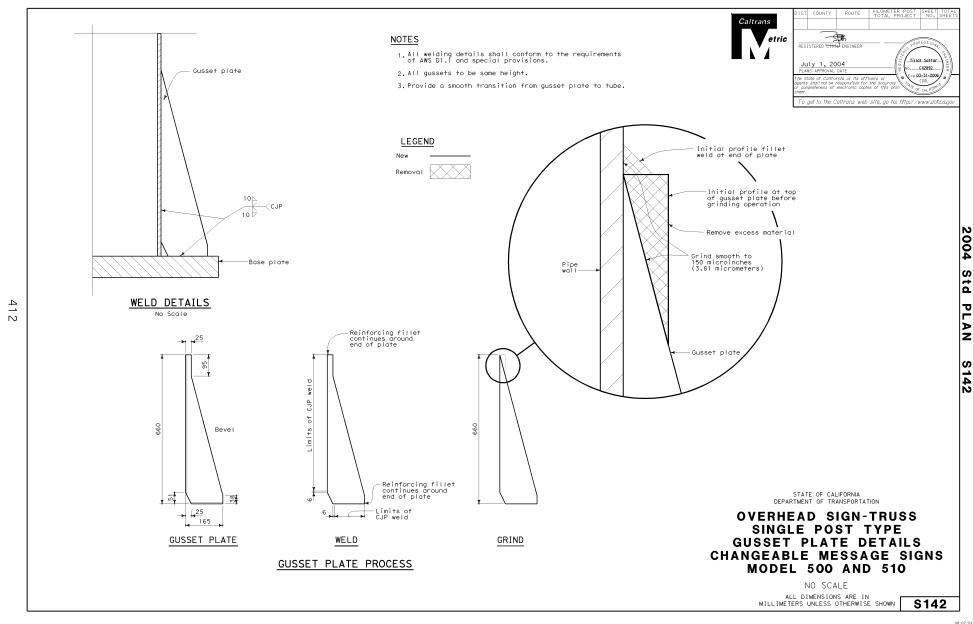
BACKSIDE WELD LUG

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**OVERHEAD SIGN-TRUSS** SINGLE POST TYPE SAFETY CABLE ANCHORAGE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500 AND 510

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

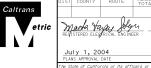


TSP Telephone service point.

### **ELECTROLIERS** High mast lighting standard STANDARD TYPES →◯ Double arm lighting standard (Type 15 shown) 15, 15D Existing electrolier to remain in place unless otherwise specified or indicated. **S**-STRUCTURE 21, 21D STRUCTURE (F)-----Foundation for future electrolier, see Project Notes. 30 NOTES $\bowtie$ 1. Luminaires shall be 310 W HPS when installed on Type 21, 210, 30, 31, 32, 35 and 36-20A Standards, unless otherwise specified. Luminaires shall be 200 W HPS when installed on other type 31 32 standards or poles, unless otherwise 35 2. Luminaires shall be the cutoff type, ANSI Type III medium cutoff lighting distribution, unless otherwise specified. 36-20A Variations noted adjacent to symbol on project plans. STANDARD NOTES AB Abandon. If applied to conduit, remove conductors. BC Install pull box in existing conduit run. BP Pedestrian barricade, type as indicated on plan. CB Install conduit into existing pull box. CC Connect new and existing conduit. Remove existing conductors and install conductors as indicated. CF Conduit to remain for future use. Remove conductors. Install pull wire or rope. DH Detector handhole. FA Foundation to be abandoned. IS Install State-furnished sign on signal mast arm. NS No slip base on standard. PEC Photoelectric control. PEU Photoelectric unit. $\fbox{RC}$ Equipment or material to be removed and become the property of the Contractor. RE Remove electrolier, fuses and ballast. Tape ends of conductors. RL Relocate equipment. RR Remove and reuse equipment. RS Remove and salvage equipment. SBI Install slip base insert. SC Splice new to existing conductors. SD Service disconnect. SF Standard to remain for future use. Remove luminaire, pole conductors, fuses and ballast. Tape disconnects.

### ABBREVIATIONS AND EQUIPMENT DESIGNATIONS PROPOSED EXISTING

BC	bc	Bolt circle
C	C	Conduit
ссти	cctv	Closed circuit television
CEC	cec	Irrigation controller enclosure cabinet
CKT	ck†	Circuit
CMS	cms	Changeable message sign
DLC	dlc	Loop detector lead-in cable
EMS	ems	Extinguishable message sign
EVC	evc	Emergency vehicle cable
EVD	evd	Emergency vehicle detector
FB	fb	Flashing beacon
FBCA	fbca	Flashing beacon control assembly
FO	fo	Fiber optic
G	G	Ground (Equipment Grounding Conductor)
GFCI	GFCI	Ground fault circuit interrupt
HAR	har	Highway advisory radio
HEX	hex	Hexagonal
HPS	hps	High pressure sodium
IISNS	iisns	Internally illuminated street name sign
ISL	isı	Induction sign lighting
LMA	Ima	Luminaire mast arm
LPS	Ips	Low pressure sodium
LTG	I†g	Lighting
LUM	lum	Luminaire
MAT	mat	Mast arm mounted vehicle signal faces,
MAS	mas	top attachment Mast arm mounted vehicle signal faces,
MAS	IIIUS	side attachment
MAS-4A	mas-4A	Mast arm mounted vehicle signal faces,
MAS-4B	mas-4B	side attachment - 4 signal section
MAS-4C	mas-4C	orde directilient 4 orginal occiton
MAS-5A	mas-5A	Mast arm mounted vehicle signal faces,
MAS-5B	mas-5B	side attachment - 5 signal section
MC	mc mc	Mercury contactor
	mlc	Magnetometer detector lead-in cable
M/M	m/m	Multiple to multiple transformer
MT	m†	Conduit with pull wire or rope only
MTG	m†g	Mounting
	m∨	Mercury vapor lighting fixture
N	N	Neutral (Grounded Conductor)
NC	NC	Normally closed
NO	NO	Normally open
PB	pb	Pull box
PEC	pec	Photoelectric control (Type I, II, III, IV or
PED		V as shown)
PEU	ped	Pedestrian Photoelectric unit
PPB	peu ppb	Pedestrian push button
RIS	ris	Radio interference suppressor
RL RL	RL	Relocated equipment
RM	rm.	Ramp metering
SBI	sbi	Slip base insert
SB	sb	Slip base
SIC	sic	Signal interconnect cable
SIG	sig	Signal
SMA	sma	Signal mast arm
S/M	s/m	Series to multiple transformer
SNS	sns	Street name sign
SP	sp	Service point
TDC	tdc	Telephone demarcation cabinet
TMS	†ms	Traffic monitoring station
TOS	tos	Traffic Operations System
VEH	veh	Vehicle
XFMR	×fmr	Transformer



Martha V. Styer E13738 6-30-07 To get to the Caltrans web site, go to: http://www.dot.ca.go

### SOFFIT AND WALL MOUNTED LUMINAIRES

Pendant, 70 W HPS unless otherwise specified.

← Flush, 70 W HPS unless otherwise specified.

₩all surface, 70 W HPS unless otherwise specified.

← Existing soffit or wall luminaire to remain unmodified.

 $\triangleleft$  —M) Existing soffit or wall luminaire to be modified as specified.

### NOTE

Arrow indicates "street side" of luminaire.

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### **ELECTRICAL SYSTEMS** (SYMBOLS AND ABBREVIATIONS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-1A

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# (SYMBOLS AND ABBREVIATIONS)

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ES-1B



Type 1 Standard "Meter On" sign

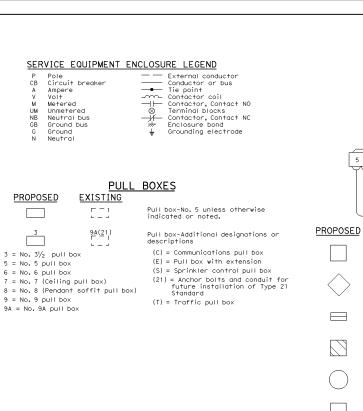
Emergency vehicle detector

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4

### **EQUIPMENT IDENTIFICATION** ILLUMINATED SIGN IDENTIFICATION NUMBER: \_\_\_\_ Sign number - Place on post or structure Sign No. 12345 10 ISL SCI 1.0 - Transformer rating (kVA) Do NOT place on standard or HM Lighting control type Number and type of fixtures structure GB ELECTROLIER OR EQUIPMENT IDENTIFICATION NUMBER: 12345 - 4.6 Mast arm length in meters, if shown, Do not place on standard or structure. Equipment number - Place on standard or structure. Existing equipment numbers are shown in parenthesis **PROPOSED** CONDUIT AND CONDUCTOR IDENTIFICATION: 41C, 2#10, 15#14, 2 DLC Number and size of conductors and cables Size of conduit in millimeters Ø1, Ø2, Ø2P, etc. Traffic phase identification for signal faces, detectors and phase diagrams 1 2 3 Project note numbers (A) (B) (C) Equipment description, installation or item numbers 1 2 3 Conduit run numbers SIGNAL AND LIGHTING STANDARD (TYPICAL DESIGNATION): 19A - 3 - 129 Wind velocity=129 km/h Case 3 arm loading Standard type Standard Plan sheet number — Detail number or letter MISCELLANEOUS EQUIPMENT **PROPOSED EXISTING** Changeable message sign 1234 Closed circuit television camera (P) Highway advisory radio pole and antenna

Extinguishable message sign





# **VEHICLE DETECTORS**

Vehicle detector designation 5 J 9 U U = Upper – Slot number in input file - Input file (I or J)

# - Phase **EXISTING** Type A detector loop. Outline of sawcut shown. Type B detector loop. Outline of sawcut shown. 53 Type C detector loop. Outline of sawcut shown. Type D detector loop. Outline of sawcut shown. Type E detector loop. Outline of sawcut shown.

dh >- ->- - Magnetic detector

Type 0 detector loop. Outline of sawcut shown.

Detector handhole

Magnetometer detectors

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# **ELECTRICAL SYSTEMS** (SYMBOLS AND ABBREVIATIONS)

NO SCALE

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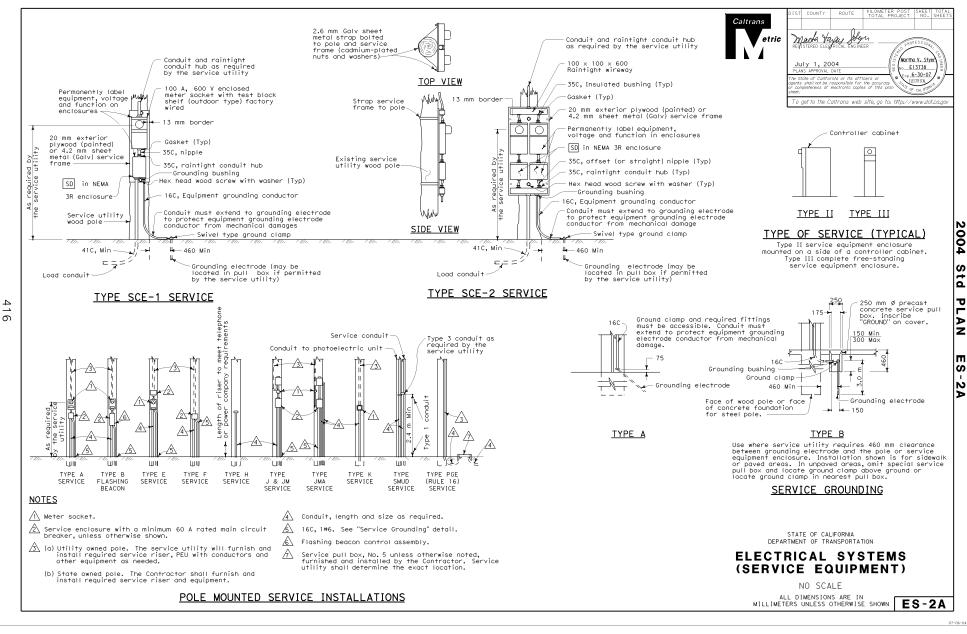
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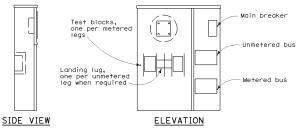
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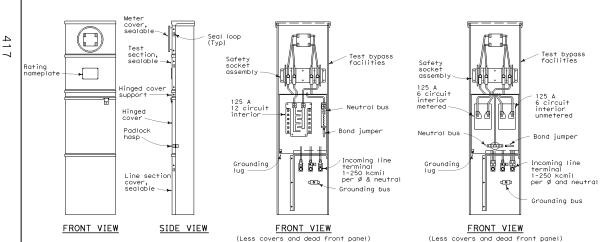








# TYPE II-A SERVICE EQUIPMENT ENCLOSURE



TYPE II-B SERVICE EQUIPMENT ENCLOSURE

For metered circuits only

For metered and unmetered circuits

# NOTES-TYPE II SERVICE EQUIPMENT ENCLOSURES

- Service equipment enclosures and metering equipment shall meet the requirements
  of the service utility. When the service utility provides both metered and
  unmetered circuits, a separate bus shall be provided for each circuit.
- Service equipment enclosures shall be factory wired NEMA 3R construction and shall be provided with dead front panel and provisions for padlocking.
- Control wiring shall be 600 V, No. 14 AWG stranded (THHN) machine tool wire. Where subject to flexing, 19 strand wire shall be used.
- 4. Main bus shall be rated for 125 A and shall be tin-plated copper.
- 5. An engraved phenolic nameplate on the dead front panel indicating the function of each circuit or device shall be installed with stainless steel rivets or stainless steel screws:
  - a) Adjacent to the breaker or device with character size a minimum of 3 mm.
  - b) At the top of the exterior door panel indicating system number, voltage level and number of phases with character size a minimum of 5 mm.
- 6. A plastic laminated wiring diagram shall be provided and attached to the inside of
- 7. In unpaved areas, a raised portland cement concrete pad of 600 mm  $\times$  100 mm  $\times$  width of service equipment enclosure foundation or controller cabinet foundation shall be constructed in front of Type II service equipment enclosure.
- Internal bus, where shown, is typical only. Alternative designs of proposed service equipment enclosure shall be submitted to the Engineer for approval.
- 9. Circuit breakers may be mounted in the vertical or horizontal position.
- Dimensions of service equipment enclosures shall meet the requirements of the service utility.
- Minimum clearance shall be required for front and back of service equipment enclosures per National Electrical Code, Article 110.26, "Spaces About Electrical Equipment (600 Volts, Nominal, or Less)".

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# **ELECTRICAL SYSTEMS** (SERVICE EQUIPMENT TYPE II SERIES)

NO SCALE

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#### NOTES-TYPE III SERVICE EQUIPMENT ENCLOSURES

- 1. Service equipment enclosure and metering equipment shall meet the requirements of the service utility. When the service utility provides both metered and unmetered circuits, a separate bus shall be provided for each circuit. The meter area shall have a sealable, lockable, weathertight cover that can be removed without the use of tools.
- 2. Service equipment enclosures shall be factory wired and conform to NEMA standards.
- Dimensions of service equipment enclosures shall meet the requirements of the service utility.
- 4. The dead front panels on Type III-A service equipment enclosures shall have a continuous stainless steel or aluminum piano hinge. The panel in front of the breakers shall be secured with captive screws and the lower panel shall be secured with a latch or captive screws. No live parts shall be mounted on the dead front panel.
- The exterior door shall have provisions for padlocking. The padlock hole shall be a minimum diameter of 11 mm.
- 6. Enclosures housing transformers of more than one kVA shall have effective screened ventilation louvers of not less than 32 000 mm². Screen shall be stainless steel No. 304, with a No. 10 size mesh. Framed screen shall be secured with at least four bolts.
- Fasteners on the exterior of the enclosure shall be vandal-resistant and shall not be removable from the exterior. Screws, nuts, bolts and washers shall be stainless steel.
- 8. Landing lugs for incoming service conductors shall be compatible with either copper or aluminum conductors sized to suit the conductors shown on the plan. Landing lugs shall be copper or tin-plated aluminum. Neutral bus shall be rated for 125 A and be suitable for copper or aluminum conductors unless otherwise specified. The terminal shall include but not be limited to:
  - a) Incoming terminals (landing lugs)
  - b) Neutral lugs
  - c) Solid neutral terminal strip
  - d) Terminal strips for conductors within the enclosure.
- 9. At least 6 standard single pole circuit breaker spaces, 20 mm nominal, shall be provided for branch circuits. Circuit breaker interiors shall be copper. Interiors shall accept plug-in or cable-in/cable-out circuit breakers.
- 10.Control wiring shall be 600 V, 14 stranded machine tool wire. Where subject to flexing, 19 strand wire shall be used.
- 11. Main bus shall be rated for 125 A and shall be tin-plated copper.
- 12.A plastic laminated wiring diagram shall be provided with brass mounting eyelets and attached to the inside of the enclosure.

- 13. An engraved phenolic nameplate on the dead front panel indicating the function of each circuit or device shall be installed with stainless steel rivets or stainless steel screws:
  - a) Adjacent to the breaker or device with character size a minimum of 3 mm
  - b) At the top of the exterior door panel indicating system number, voltage level and number of phases with character size a minimum of 5 mm.
- 14. The plan shows the approximate location of devices within the enclosure. Components may be recorranged, however, the "working" clearances within the service equipment enclosure shall be maintained.
- 15. In unpaved areas a raised portland cement concrete pad 600 mm x 100 mm x width of foundation shall be constructed in front of new service equipment enclosure installation. Pad shall be set to elevation of foundation.
- 16. Foundation shall extend 50 mm minimum beyond edge of service equipment enclosure.
- 17. Internal bus, where shown, is typical only. Alternative design of proposed service equipment enclosure shall be submitted to the Engineer for approval.
- 18. Plug-in circuit breakers may be mounted in the vertical or horizontal position. Cable-in/cable-out circuit breakers shall be mounted in the vertical position.
- Type III-AF and Type III-BF service equipment enclosures shall have the meter viewing windows located on the front side of the service equipment enclosures.
- 20. The Type III-AR and Type III-BR service equipment enclosures shall be similarly constructed as Type III-AF and Type III-BF respectively, except the meter viewing windows shall be located on the back side of the service equipment enclosures.
- Minimum clearance shall be required for front and back of service equipment enclosure per National Electrical Code, Article 110.26, "Spaces About Electric Equipment (600 Volts, Nominal, or Less)".

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# ELECTRICAL SYSTEMS (SERVICE EQUIPMENT NOTES TYPE III SERIES)

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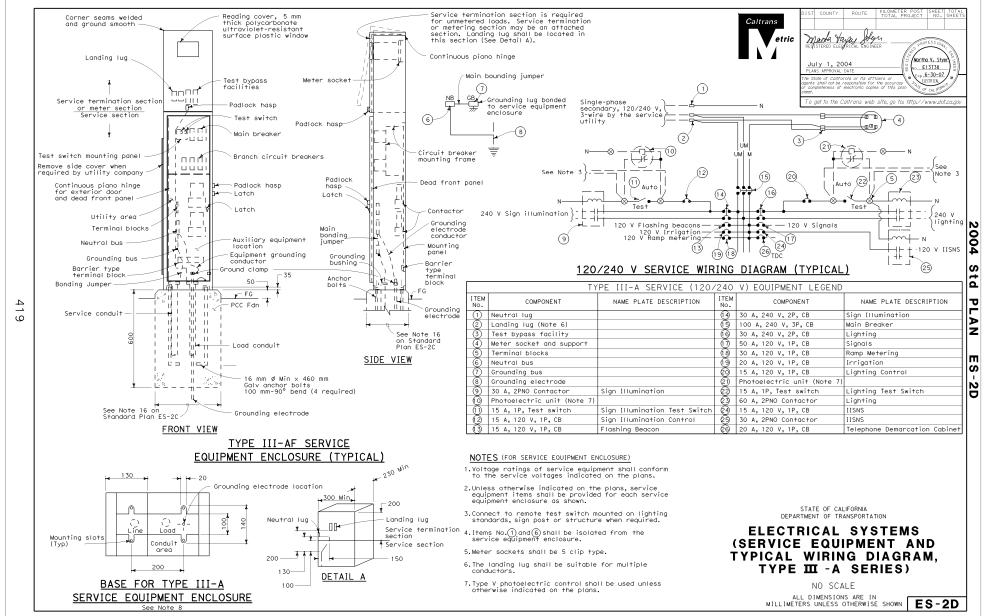
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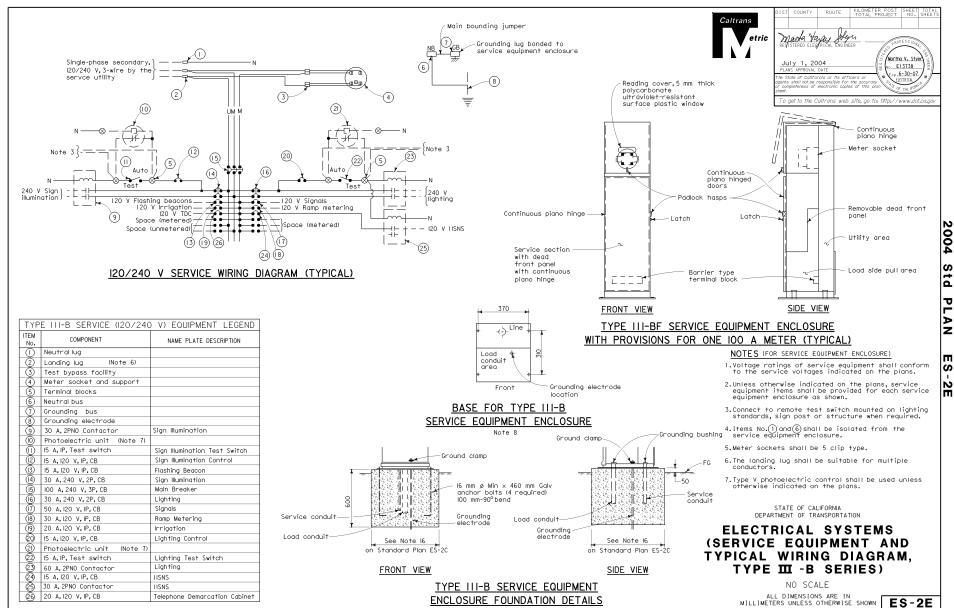
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NAME PLATE DESCRIPTION

Sign Illumination

Main Breaker

Ramp Metering

Lighting Control

Lighting Control

Telephone Demarcation Cabinet

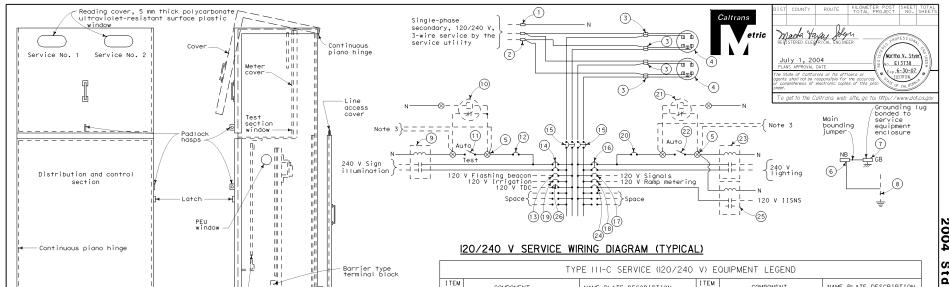
Irrigation

Lighting

LISNS

Lighting

Signals



No.

# TYPE III-CF SERVICE EQUIPMENT ENCLOSURE WITH PROVISIONS FOR TWO IOO A METERS (TYPICAL)

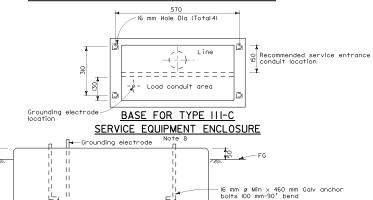
FOUNDATION DETAIL

(See Note 16 on Standard Plan ES-2C)

Continuous piano hinge dead front panel latch

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FRONT VIEW



- $_{\rm H\,I}$ 

SIDE VIEW

(4 required)

# NOTES (FOR SERVICE EQUIPMENT ENCLOSURE)

COMPONENT

Test bypass facility

Grounding electrode

30 A,2PNO, Contactor

15 A,1P, Test switch

15 A,120 V,1P,CB

(13) | 15 A,120 V,1P,CB

Photoelectric unit (Note 7)

Terminal blocks

Meter socket and support

Neutral lug

Landing lug

Neutral bus

Grounding bus

Voltage ratings of service equipment shall conform to the service voltages indicated on the plans.

(Note 6)

NAME PLATE DESCRIPTION

ign Illumination

Flashing Beacon

Sign Illumination Test Switch

Sign Illumination Control

- 2.Unless otherwise indicated on the plans, service equipment items shall be provided for each service equipment enclosure as shown.
- Connect to remote test switch mounted on lighting standards, sign post or structure when required.
- 4. Items No.(1) and (6) shall be isolated from the service equipment enclosure.
- 5.Meter sockets shall be 5 clip type.
- 6. The landing lug shall be suitable for multiple conductors.
- Type V photoelectric control shall be used unless otherwise indicated on the plans.

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COMPONENT

Photoelectric unit(Note (22) 15 A,1P,Test switch

30 A,240 V,2P,CB

(15) 100 A,240 V,2P,CB

(16) 30 A,240 V,2P,CB

(17) 50 A,120 V,1P,CB

(18) 30 A,120 V,1P,CB

(19) 20 A,120 V,1P,CB

(20) 15 A,120 V,1P,CB

(23) 60 A,2PNO Contactor

30 A,2PNO Contactor

(24) 15 A,120 V,1P,CB

(26) 20 A,120 V,1P,CB

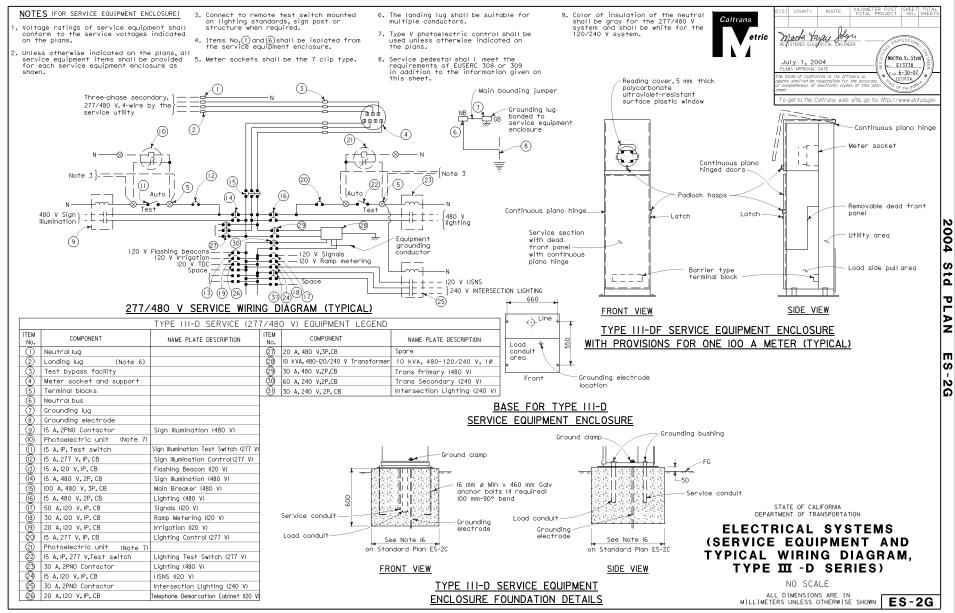
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# **ELECTRICAL SYSTEMS** (SERVICE EQUIPMENT AND TYPICAL WIRING DIAGRAM TYPE III -C SERIES)

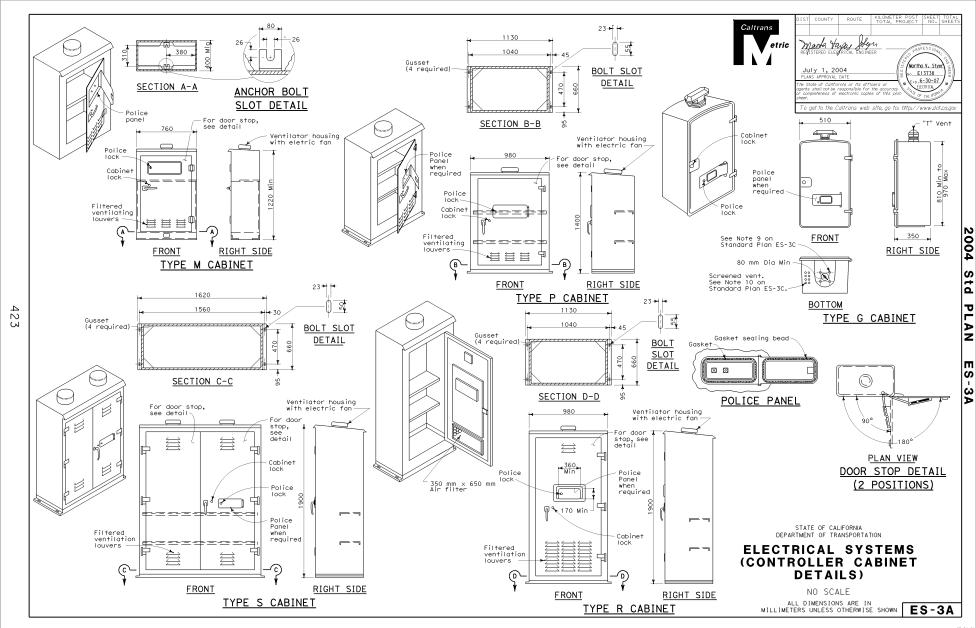
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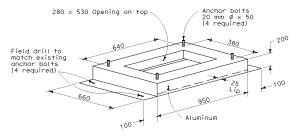
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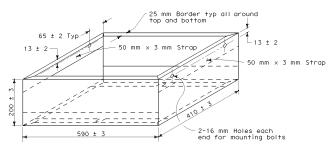
V)





# TYPE PR CABINET ADAPTER

1. Material: 4.78 thickness aluminum plate. 2. Mount adapter on Type P or Type R cabinet foundation.



# TYPE M CABINET ADAPTER

- Mount adapter on Type M cabinet foundation.
   Mounting bolts shall be 10 mm Ø minimum size.
   Aluminum (4.78 mm thickness).

The flasher transfer relay shall intermate with a CINCH-JONES Socket S-408-SB or equal connected as follows:

Pin No.	Circuit	Pin No.	Circuit
1	Coil	5	Common, Circuit #1
2	Coil	6	Common, Circuit #2
3	NC Circuit #1	7	NO Circuit #1
4	NC Circuit #2	8	NO Circuit #2

8			7	
6	•		5	
4			3	
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# CONNECTOR SOCKET FLASH TRANSFER RELAY

The flasher shall intermate with a CINCH-JONES Socket S-406-SB or equal connected as follows:

Pin No.	Circuit	Pin No.	Circuit
7	Load, Circuit #1	10	ac+
8	Load, Circuit #2	11	ac-
a	Chassis Ground	12	Not used



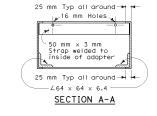
# CONNECTOR SOCKET SOLID STATE FLASHER UNIT

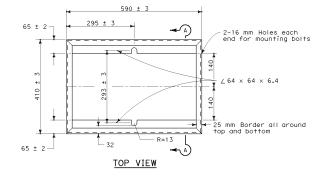
The Solid-state switching device shall intermate with a CINCH-JONES Socket S-2412-SB or equal connected as follows:

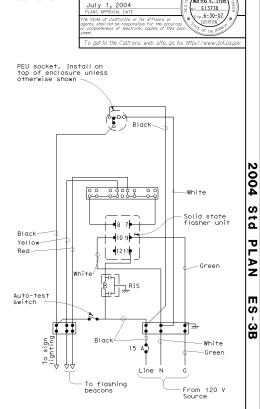
Pin No	. Circuit	Pin No.	Circuit
1	ac + Lights	7	Green or Walk Output
2	Chassis Ground	8	Yellow Input
3	Red or Don't Walk Output	9	dc+ (15 to 24 V)
4	Not used	10	Green or Walk Input
5	Yellow Output	11	ac-
6	Red or Don't Walk Input	12	Not used

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8			7
10			9
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# CONNECTOR SOCKET SOLID STATE SWITCHING DEVICE







ROUTE KILOMETER POST TOTAL PROJECT

Martha V. Stye

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WIRING DIAGRAM FLASHING BEACON CONTROL ASSEMBLY

> STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# **ELECTRICAL SYSTEMS** (CONTROLLER CABINET DETAILS)

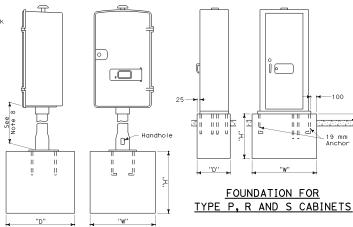
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ES-3B

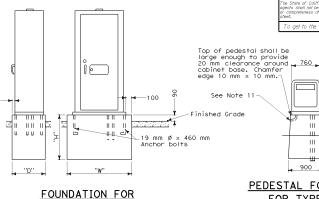
#### NOTES - CONTROLLER CABINETS

- 1. Cabinet dimensions are nominal.
- 2. Foundations shall be located to provide 600 mm minimum clearance between face of curb and any portion of cabinet.
- Type G, M, P, R, S and Model 336 cabinets shall be installed with the back toward the nearest lane of traffic.
- 4. The controller cabinet ground bus shall be bonded to the controller equipment enclosure.
- 5. In unpaved areas, a raised portland cement concrete pad shall be constructed in front of each controller cabinet. Pad shall be 900 mm x 900 mm x 100 mm for Type G cabinets and shall be 900 mm x 100 mm thick x width of foundation for Types M, P, R, S and Model 336 cabinets.
- In unpaved areas, the top of foundation for Type G, P, R and S cabinets shall be 150 mm above surrounding grade. Top of foundation for Type M or Model 336 cabinet shall be 460 mm above surrounding grade.
- In sidewalks and other paved areas, top of foundation for Type G cabinet shall be level with surrounding grade. Top of foundation for Type P, R and S cabinets shall be 90 mm above surrounding
- 8. The steel pedestal, base plate, bolt circle and foundation for Type G cabinet shall be the same as that shown for a Type 1-C Standard. Pedestal shall be 640 mm 760 mm in length. Anchor bolts shall be 19 mm Ø x 460 mm with a 50 mm 90° bend. Four bolts required per cabinet.
- Type G cabinet shall be provided with a slipfitter to permit mounting an 114 mm outside diameter pedestal. Slipfitter shall be bolted to bottom of the cabinet.
- 10. Type G cabinet shall be provided with 8 screened, raintight holes, 13 mm diameter or larger, in the bottom of the cabinet.
- 11. A 25 mm drain shall be provided through the foundation of a Type M or Model 336 cabinet. Drain pipe shall be screened.
- 12. See Table for cabinet and foundation dimensions; "D" = Depth, "H" = Height and "W" = Width.
- 13. Cabinet shelves shall be adjustable for vertical spacing and shall be removable. Type M, P, R and S cabinets shall be provided with a minimum of two shelves.
- 14. Anchor bolts for Type M, P, R, S and Model 336 cabinets shall be 19 mm Ø  $\times$  460 mm with a 50 mm 90° bend.
- 15. An approved mastic or caulking compound shall be placed on the foundation prior to placing the cabinet to seal openings between bottom of cabinet and foundation.
- 16. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit safe and easy removal or replacement without removing any other piece of equipment.
- 17. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.
- 18. Where telephone interconnect is required, a minimum of 130 mm clear vertical space shall be provided inside the cabinet for the
- 19. Telephone interconnect conductors shall be enclosed in a 210 or larger conduit through the foundation. Type 4 metal conduit shall be used to separate telephone and power conductors in cabinets and pedestals.
- 20. For Model 332, 334 and 336 cabinet details, see "Traffic signal controller equipment specifications".



FOUNDATION DETAILS

For Model 332 and 334 cabinets



PEDESTAL FOUNDATION FOR TYPE M OR MODEL 336 CABINET

CABINET

MODEL

336

Р

Caltrans

mada Yayay Hyn

Ш

FOUNDATION

W (mm)

600

SEE

DETAIL ABOVE

1330

1330

1820

(mm)

600

560

710

710

(mm)

SEE

DE TAIL ABOVE

460

460

460

900

To get to the Caltrans web site, go to: http://www.dot.ca.go

- Finished Grade

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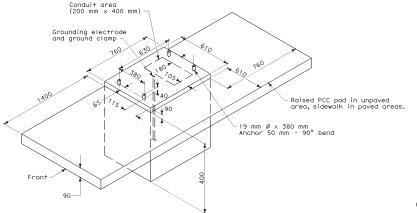
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Martha V. Styer

E13738 6-30-07

# FOUNDATION FOR TYPE G CABINET

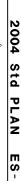


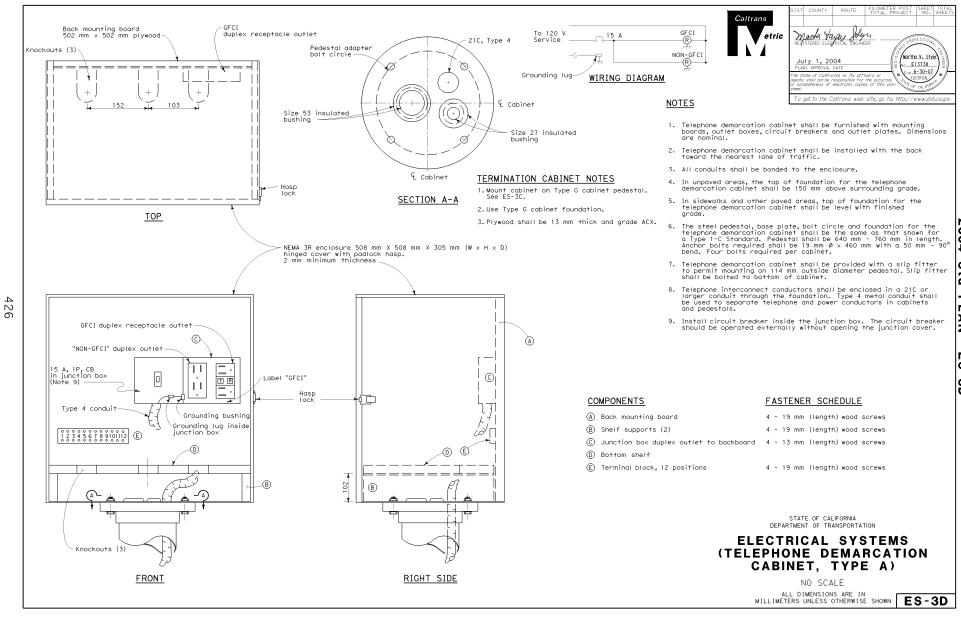
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

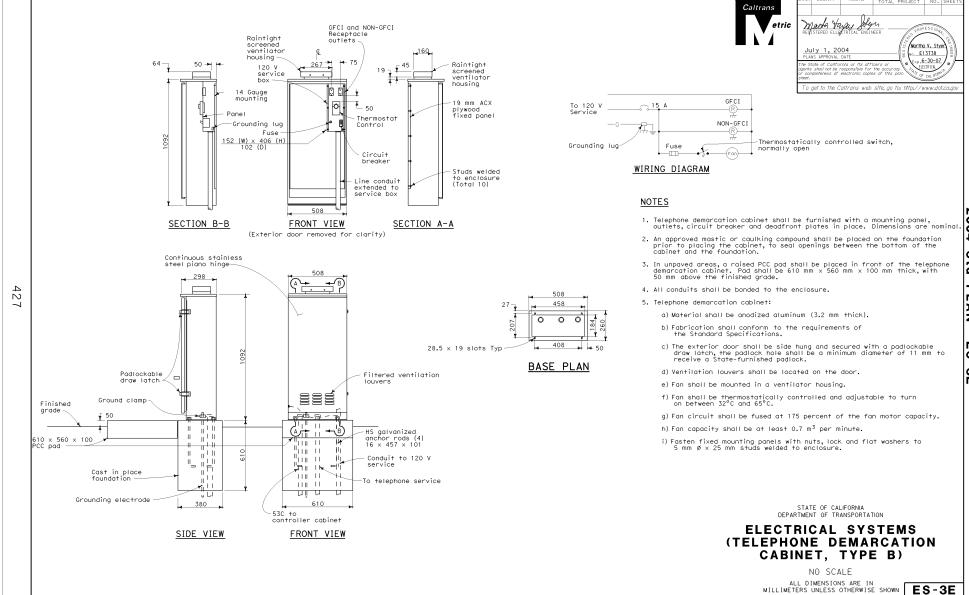
# **ELECTRICAL SYSTEMS** (CONTROLLER CABINET **DETAILS**)

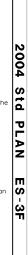
NO SCALE

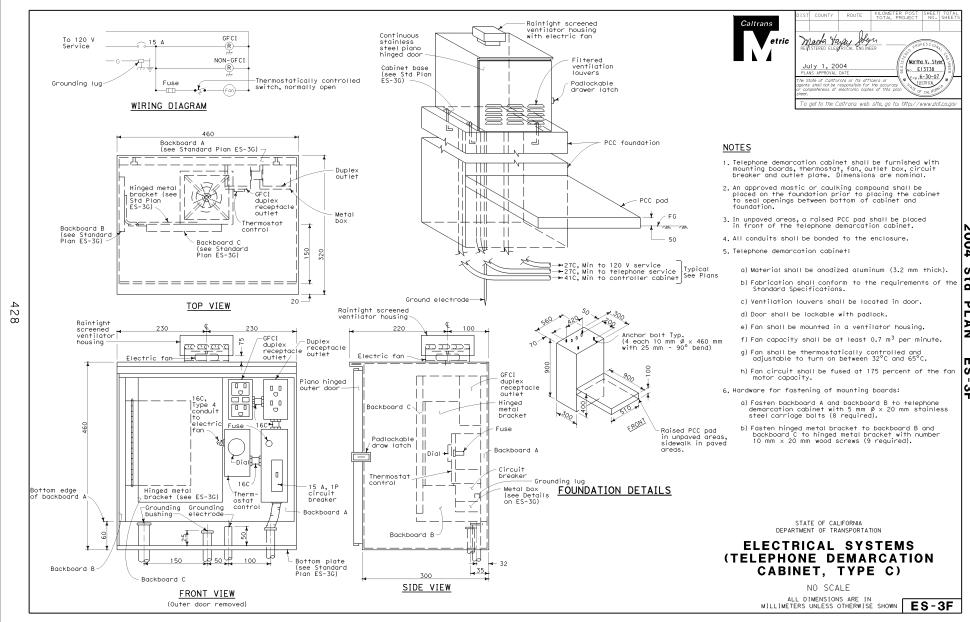
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

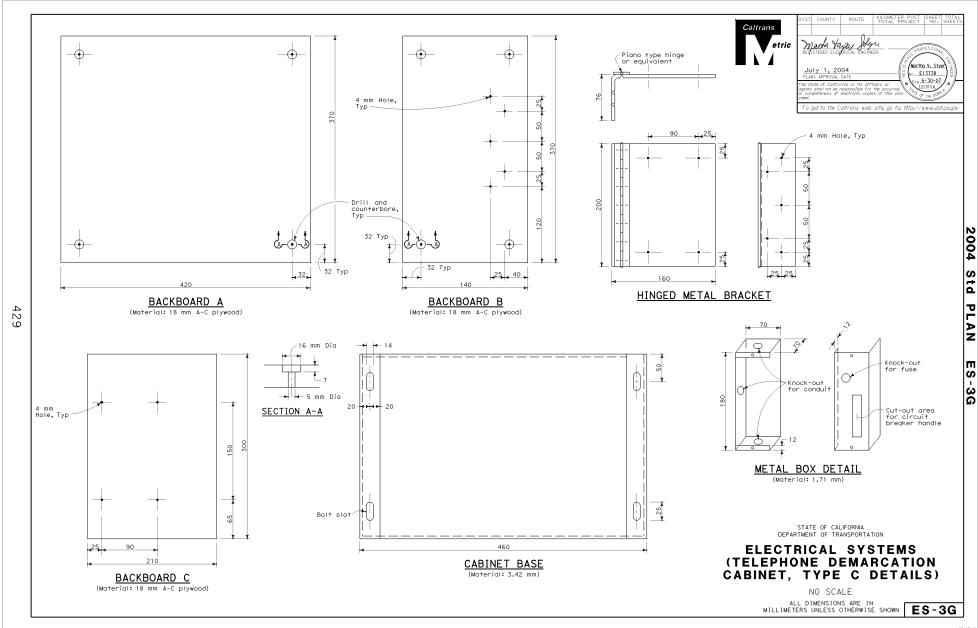














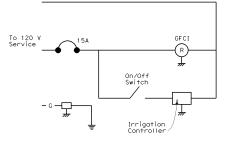
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# <u>NOTE</u>

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Duplex convenience receptacles shall have ground fault circuit interrupter as defined by the Code. Circuit interruption shall occur on 6 mA of ground fault current and shall not occur on less than 4 mA. Receptacles shall be installed in a weatherproof housing with rainproof lift covers.



99

Joint

Concrete foundation

Irrigation controller

On/Off Switch

Grounding lug

Ground clamp

Grounding electrode

760 Min

430

0

Irrigation controller enclosure cabinet

<u>PLAN</u>

**ELEVATION** 

→ | → 75

27C

Concrete pad

16C, Type 1 or 4

Ground clamp, Typ

GFCI Duplex receptacle outlet

-15 A CB

Conduit from electric service

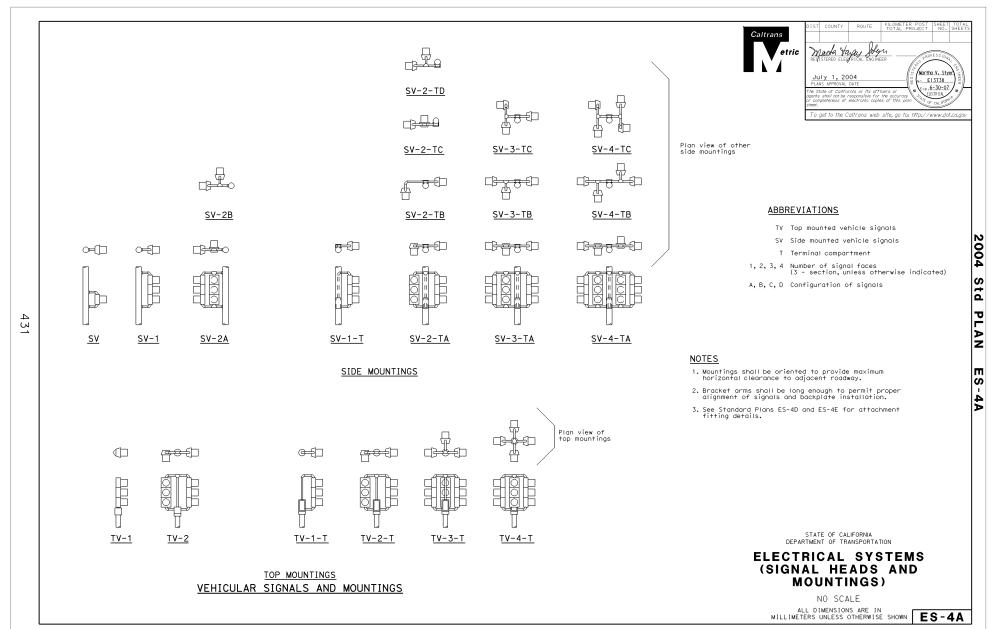
IRRIGATION CONTROLLER **ENCLOSURE CABINET** WIRING DIAGRAM (TYPICAL)

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# **ELECTRICAL SYSTEMS** (IRRIGATION CONTROLLER **ENCLOSURE CABINET)**

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-3H



/Martha V. Stye

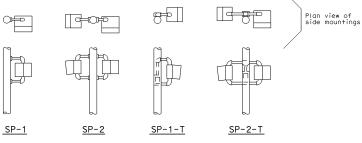
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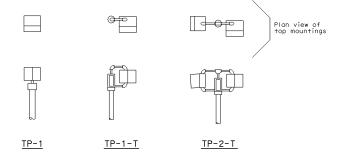
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# SIDE MOUNTINGS



TOP MOUNTINGS PEDESTRIAN SIGNALS AND MOUNTINGS





PEDESTRIAN SIGNAL FACE SYMBOL TYPE

### NOTES

**METER** 

"METER ON" SIGN

- Mounting shall be oriented to provide maximum horizontal clearance to adjacent roadway.
- Bracket arms shall be long enough to permit proper alignment of signals.
- 3. See Standard Plan ES-4D for attachment fittings details.

# **ABBREVIATIONS**

- Top mounted pedestrian signal
- Side mounted pedestrian signal
- Terminal compartment
- 1,2 Number of signal faces

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# **ELECTRICAL SYSTEMS** (SIGNAL HEADS AND **MOUNTINGS**)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-4B



See Note L





W

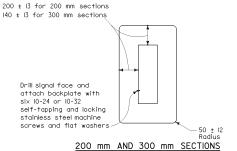






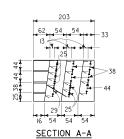
FULL CIRCLE CAP OR CUT AWAY

(Right angle is **VISORS** reversed of figure)



# **BACKPLATE**

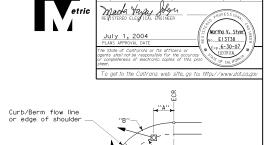
1.5 mm minimum thickness 3001-14 aluminum, or plastic when specified

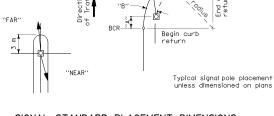




# FRONT VIEW **DIRECTIONAL LOUVER**

Directional louvers shall be oriented as directed by the Engineer and secured in place with one plated brass machine screw and nut.





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# SIGNAL STANDARD PLACEMENT DIMENSIONS AND EQUIPMENT LOCATIONS

# NOTE

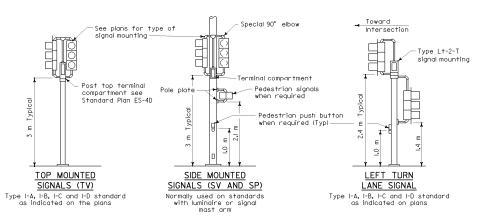
I. For "A" and "B" dimensions, see Pole Schedule, or as directed by the Engineer.

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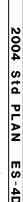
# **ELECTRICAL SYSTEMS** (SIGNAL HEADS AND MOUNTINGS)

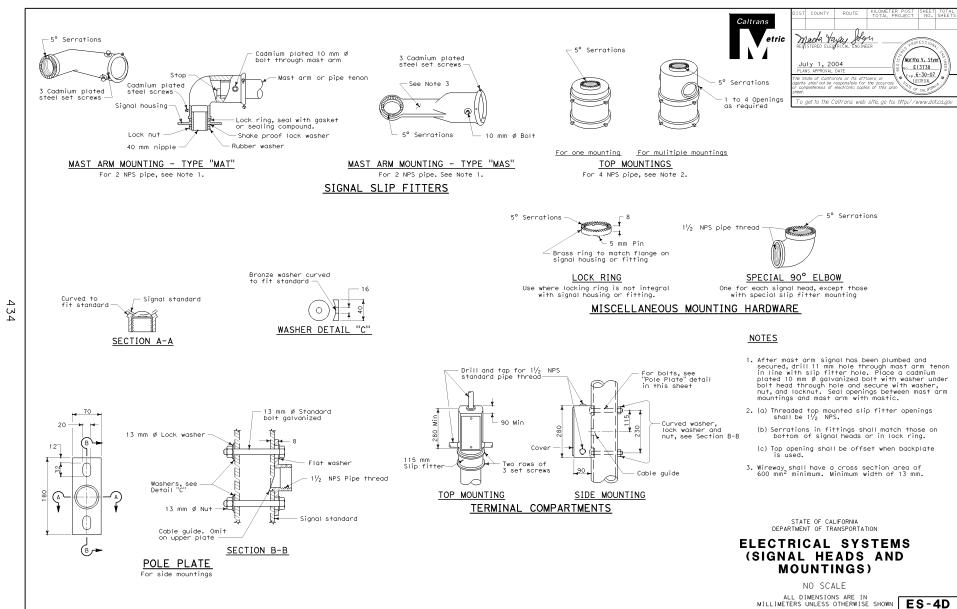
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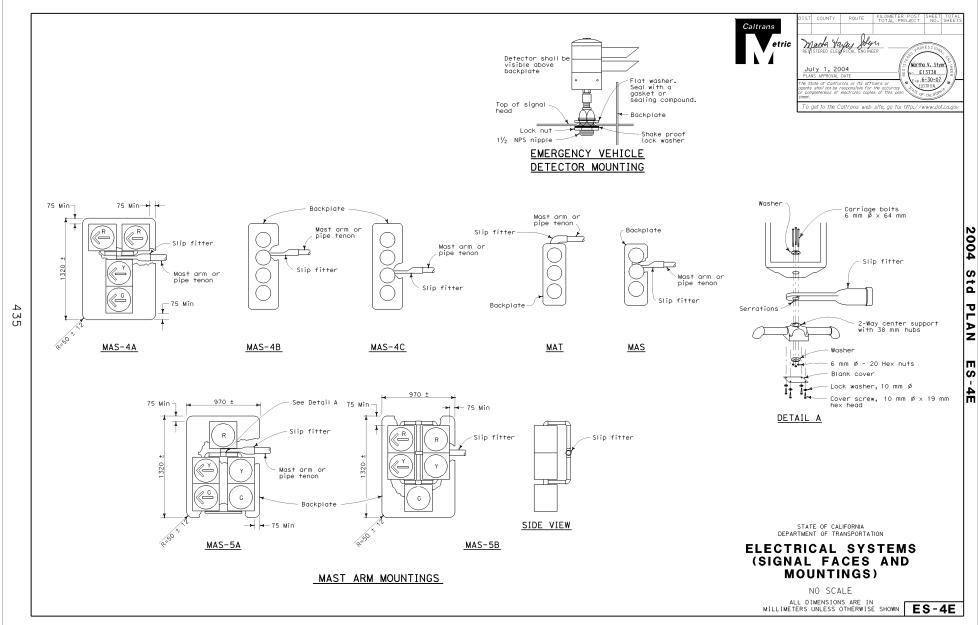
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-4C



TYPICAL SIGNAL INSTALLATIONS

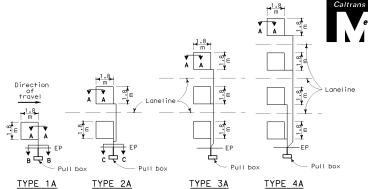






## LOOP INSTALLATION PROCEDURE

- 1. Loops shall be centered in lanes.
- Saw slots in pavement for loop conductors as shown in details.
- Distance between side of loop and a lead-in saw cut from adjacent detectors shall be 600 mm minimum. Distance between lead-in saw cuts shall be 150 mm minimum.
- Bottom of saw slot shall be smooth with no sharp edges.
- Slots shall be washed until clean, blown out and thoroughly dried before installing loop conductors.
- Adjacent loops on the same sensor unit channel shall be wound in
- Identify and tag loop circuit pairs in the pull box with loop number, start (S) and finish (F) of conductor. Identify and tag lead-in-cable with sensor number and phase.
- install loop conductor in slot using a 5 mm to 6 mm thick wood paddle. Hold loop conductors with wood paddles (at the bottom of the sawed slot) during sealant placement.
- 9. No more than 2 twisted pairs shall be installed in one sawed slot.
- 10. Allow additional 1.5 m of slack length of conductor for the lead-in run to pull box.
- The additional length of each conductor for each loop shall be twisted together into a pair (6 turns per meter minimum) before being placed in the slot and conduit leading to pull box.
- 12. Test each loop circuit for continuity, circuit resistance and insulation resistance at the pull box before filling slots.
- 13. Fill slots as shown in details.
- 14. Splice loop conductors to lead-in cable. Splices shall be soldered.
- 15. End of lead-in-cable and Type 2 loop conductor shall be waterproofed prior to installing in conduit to prevent moisture from entering the cable.
- 16. Lead-in-cable shall not be spliced between the pull box and the controller cabinet terminals.
- 17. Test each loop circuit for continuity, circuit resistance and insulation resistance at the controller cabinet location.
- 18. Where loop conductors are not to be spliced to a lead-in-cable, the ends of the conductors shall be taped and waterproofed with electrical insulating coating.



TYPE 2A INSTALLATION INSTALLATION

TYPE 3A TYPE 4A INSTALLATION INSTALLATION

# SAWCUT DETAILS

(Type A loop detector configurations illustrated)

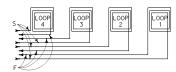
- 1. 1A.thru 4A = 1 Type A loop configuration in each lane.
  2. 1B thru 4B = 1 Type B loop configuration in each lane.
  3. 1C = 1 Type C loop configuration entering lanes as required.
  4. 1D thru 4D = 1 Type B loop configuration in each lane.
  5. 1E thru 4E = 1 Type E loop configuration in each lane.
  6. 10 thru 40 = 1 Type B loop configuration in each lane.
  (Use Type A, B, C, D, E or 0 loop detector configurations only when specified or shown on plans)



-See Note 9







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July 1, 2004

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ROUTE KILOMETER POST TOTAL PROJECT

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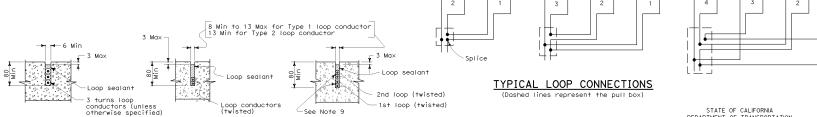
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SECTION A-A SECTION B-B SECTION C-C SLOT DETAILS - TYPE 1 AND TYPE 2 LOOP CONDUCTOR

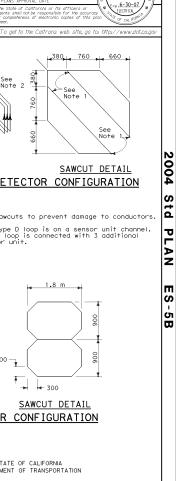
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **ELECTRICAL SYSTEMS** 

(DETECTORS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ES-5A



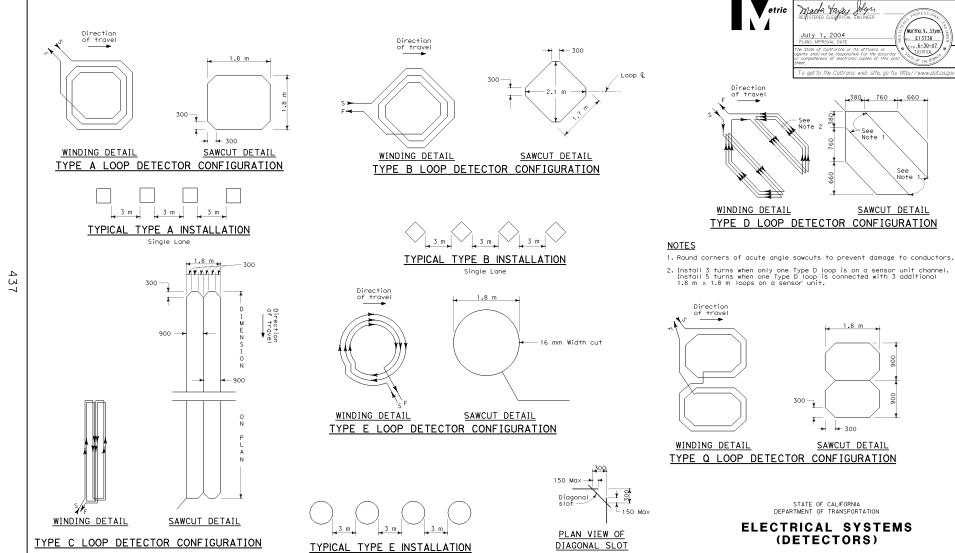
NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-5B

Martha V. Styer

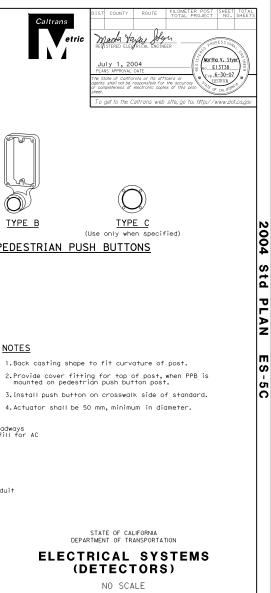
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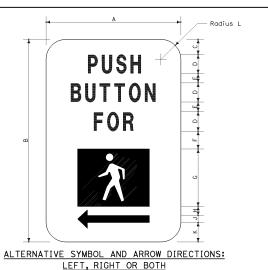
Caltrans



Single Lane

AT CORNERS











**BOTH** 

# RIGHT FOR BICYCLE LANES

(Use only when specified) Black legend on white background



NOTES

PEDESTRIAN PUSH BUTTONS





RIGHT

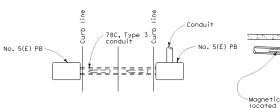
l					SIG	N DIMEN	SIONS (	mm)				
l		Α	В	С	D	E	F	G	н	J	К	L
١	Nominal	130	190	15	20	10	12	50	10	6	17	20

#### NOTE

 $^{\circ}$  $\alpha$ 

Color of legend and arrow are black. Color of background and symbol are white.

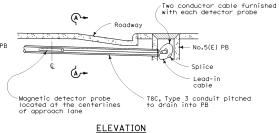
PLAN



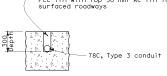
# PEDESTRIAN PUSH BUTTON SIGNS

MAGNETIC VEHICLE DETECTOR

INSTALLATION DETAILS



# PCC fill for PCC surfaced roadways PCC fill with top 50 mm AC fill for AC

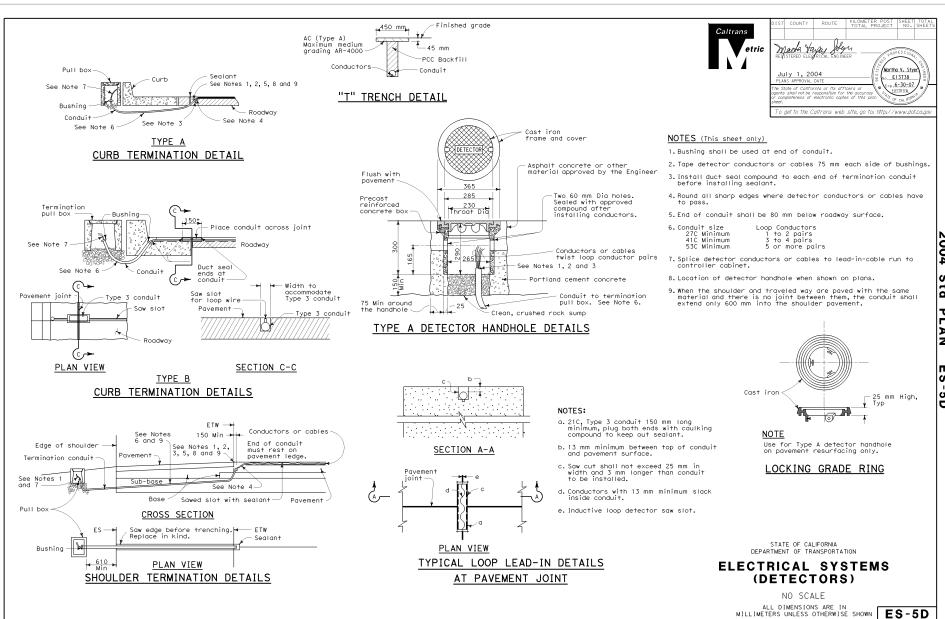


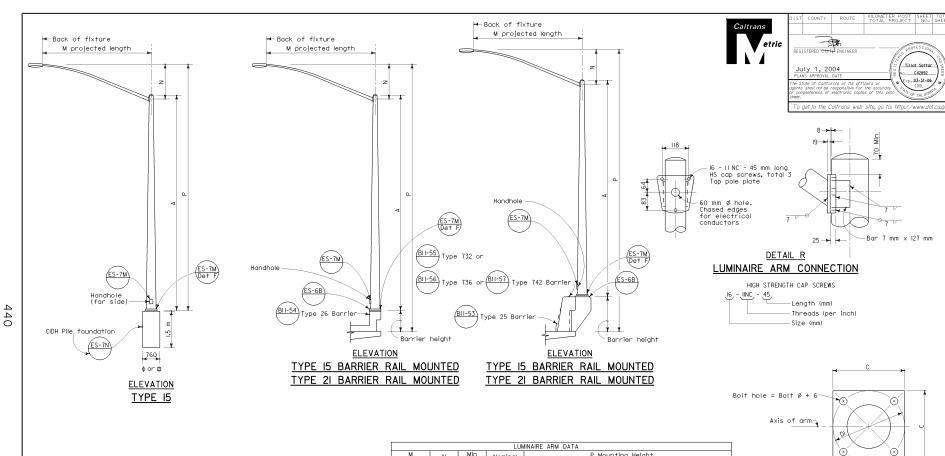
SECTION A-A

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ES-5C







			POLE	DATA		BASE PLATE DATA			LUMBIAIDE	
P	OLE	Α	Min	OD	Wall			LUMINAIRE ARM		
T	YPE	Height	Base	Тор	Thickness	·	Circle	ness	Size	AINW
		m	mm	mm	mm				nm	m
	15	9.1	203	98	3.04	305	305	25	25 Ø x 915 x 102*	1.8-4.6 3.7
	21	10.7	219	98	3.04	305	305	25	See ES-6B	1.8-4.6 3.7

				LUN	MINAIRE AF	RM DATA		
_	Projected	N Rise	Min OD At Pole	Nominal		P Mounting Hei		
	Projected Length	Rise	At Pole	Thickness	Type I5	Type I5 (810 mm Barrier)	Type 21 (810 mm Barrier)	
	m	mm	mm	mm	m	m	m	
4	1.8	610±	83	3.04	9.5±	10.3±	11.9±	
	2.4	760±	89	3.04	9.7±	10.5±	12.1±	
Н	3.1	990±	98	3.04	9.9±	± 10.7± 12.3±		
Ш	3.7	1290±	98	3.04	10.2±	11.0± 12.6±		
	4.6	1450±	108	3.04	10.3±	11.1±	12.8±	

NOTES

\* For barrier rail bolts, see Standard Plan ES-6B.

- 1.  $\square$  Indicates arm length to be used unless otherwise noted on the plans.
- 2. For Type 15-SB, use Type 15 standard with Type 30 base plate details, see Standard Plan ES-6F.
- 3. For additional notes, see Standard Plan ES-7M and ES-7N.
- 4. For Type 15-SBI, see Standard Plan ES-6C.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

BASE PLATE

# **ELECTRICAL SYSTEMS** (LIGHTING STANDARDS **TYPES 15 AND 21)**

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-6A

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2004

Std PLAN

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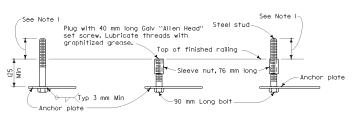
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#### NOTES

- I. Anchor bolt or stud length shall be such that thread extends 13 mm maximum above nut on level base plate after grouting. See Detail "N".
- 2. Electrolier anchor bolts shall be held in position for pouring by means of anchor plates and suitable templates. Deviation from the true position, vertical and height, shall not exceed 1.5 mm.
- 3. See railing sheets for reinforcement and structural details at electroliers and pull boxes.



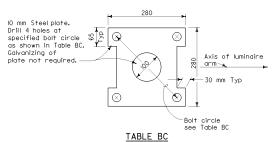
FOR IMMEDIATE INSTALLATION

4

FOR FUTURE INSTALLATION WITH PLUG

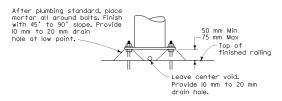
FOR INSTALLATION ON FUTURE ANCHORAGE WITH STUD

# DETAIL B **ELECTROLIER ANCHORAGES**



Туре	Bolt Circle	Anchor Bolt Diameter
15	305 mm	25 mm
21	305 mm	32 mm

ANCHOR PLATE



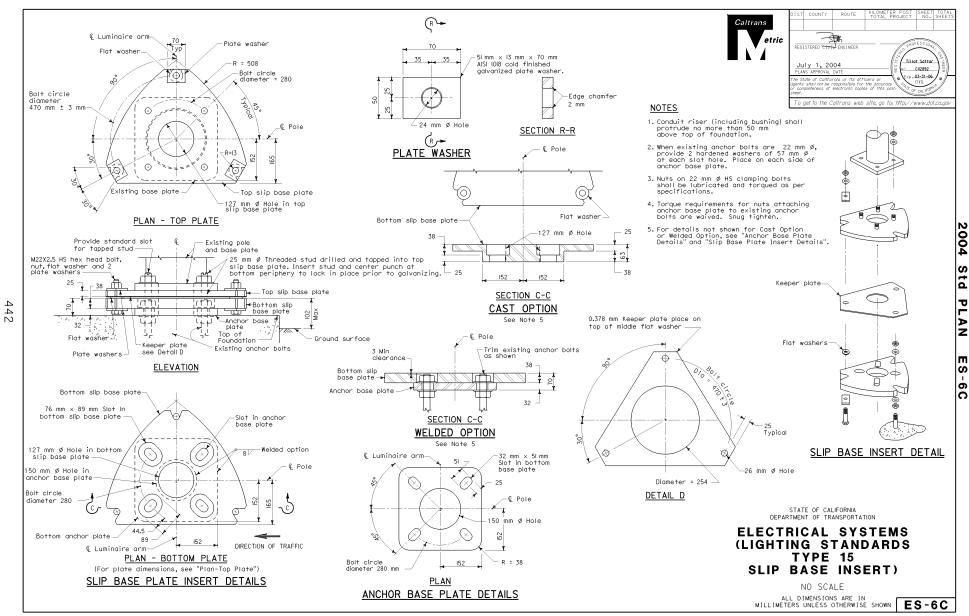
DETAIL N **GROUTING AT ELECTROLIER** 

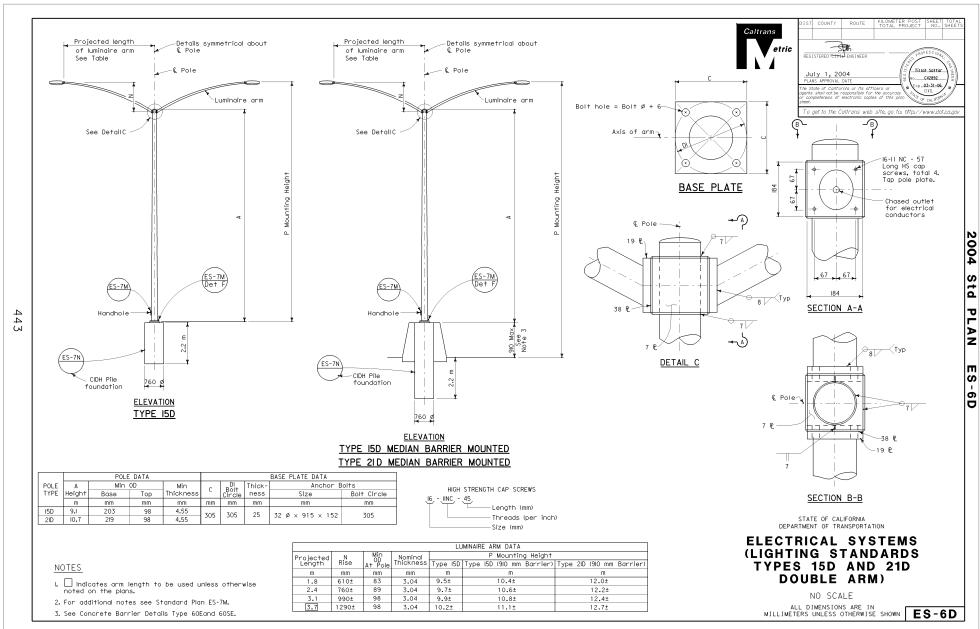
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

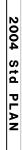
# **ELECTRICAL SYSTEMS** (LIGHTING STANDARDS TYPES 15 AND 21 BARRIER RAIL MOUNTED DETAILS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-6B











ROUTE REGISTERED CIVIL ENGINEER

Caltrans

NOTES

 Sheet steel shall have a minimum yield of 331 MPa. 2. For slip base details see Standard Plan ES-6F.

Tillat Satta July 1, 2004 C42892 ×o ...03-31-0€ he State of California or its officers or

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# LUMINAIRE ARM DATA

	PROJECTED LENGTH	THICKNESS	MINIMUM OD @ POLE	MOUNTING HEIGHT
	m	mm	mm	m
×	1.8		83	11.2±
	2.4	3.04	89	11.4±
	3.1	3.04	95	11.6±
	3.7		95	11.9±
	4.6		108	12.0±
* *	6.1	4.55	127	11.3±

\* Type 30 - arm length I.8 m - 4.6 m maximum

**-** 760 ø

**ELEVATION** 

CIDH Pile

foundation

\*\* Type 31- arm lengths 6.1 m

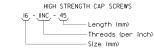
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# DETAIL A - TYPE 30

Provide removable raintight cap

I6-IINC - 45 mm long HS cap screws, total 3. Tap pole plate.

60 mm Ø hole. Chased edges for electrical conductors

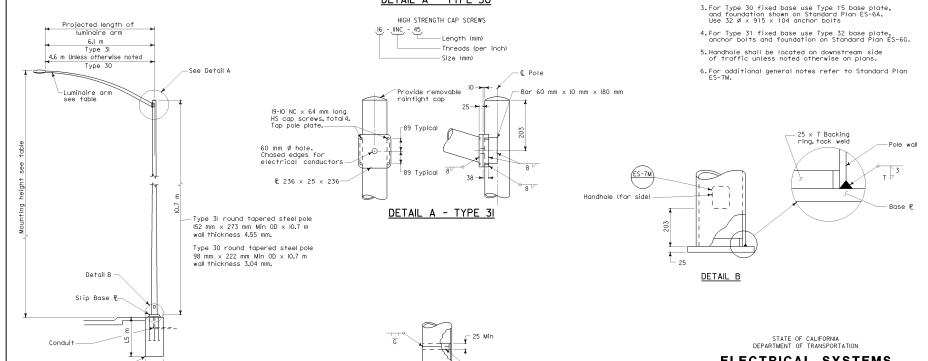


# **ELECTRICAL SYSTEMS** (LIGHTING STANDARDS TYPES 30 AND 31

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

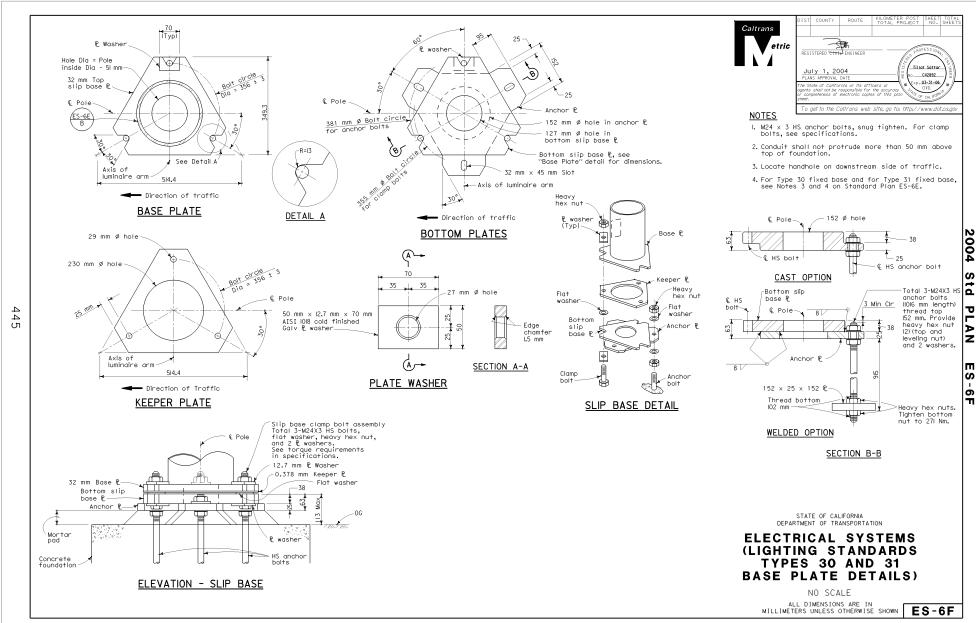
ES-6E

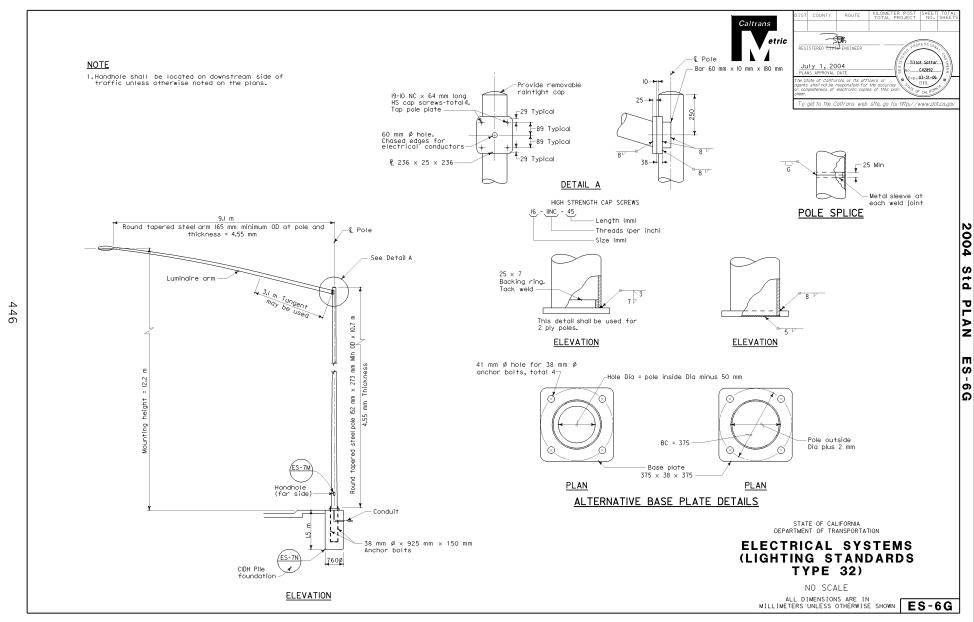


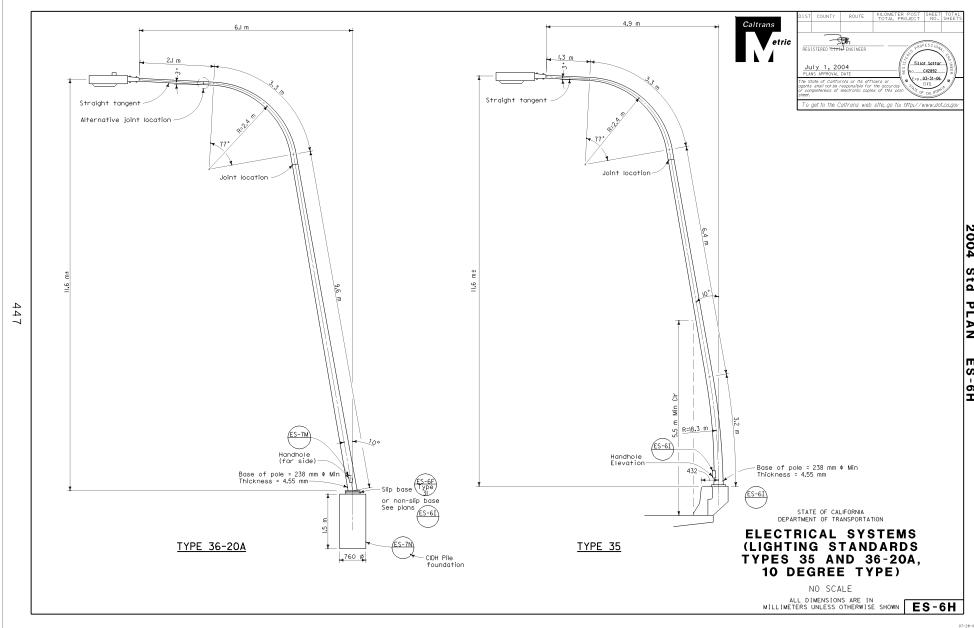
Metal sleeve at each

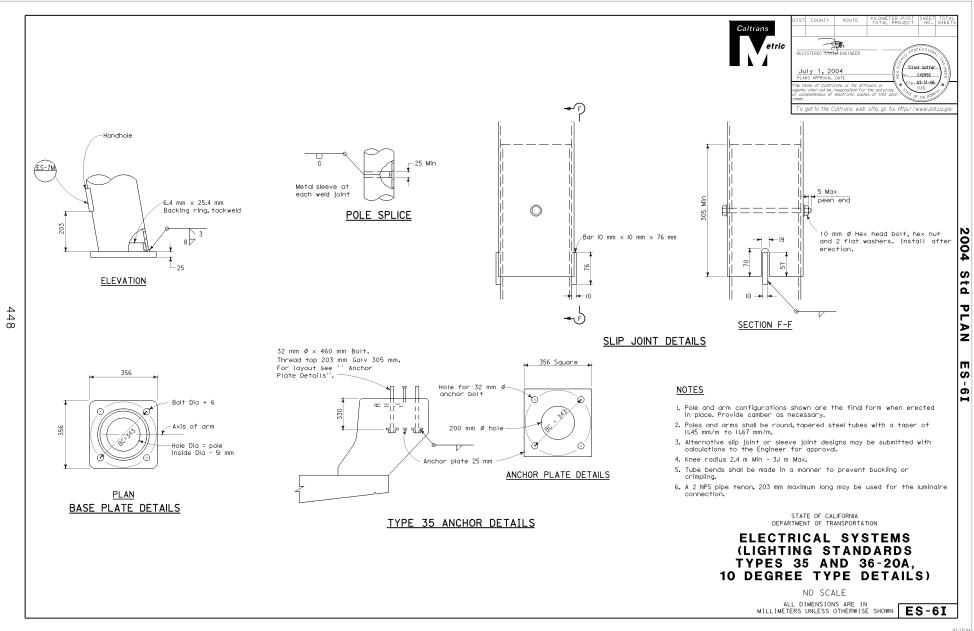
weld joint

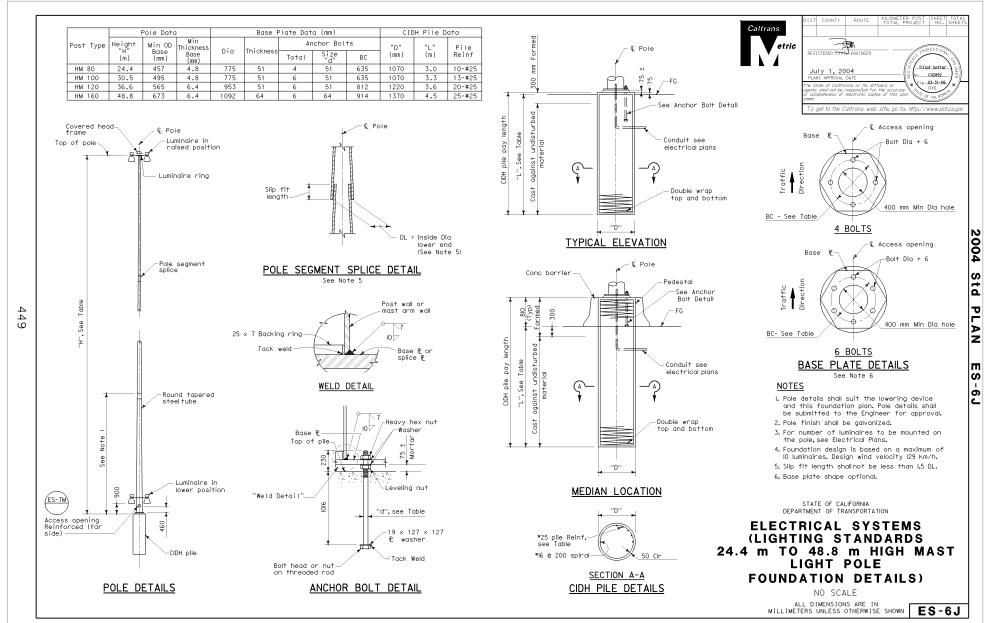
POLE SPLICE











Nominal hickness
mm
3.04
4.55

LUMINAIRE ARM DATA

Rise

mm

1450± 108

750±

Length

4.6

6.1

50

Min OD At Pole

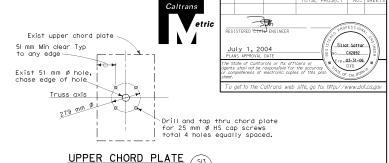
mm

127

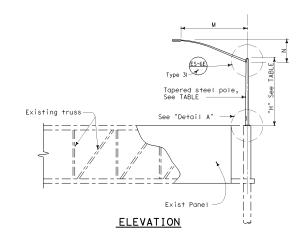
Nomin

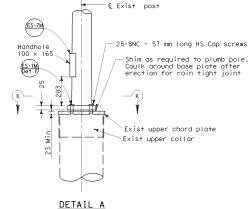
Thickn

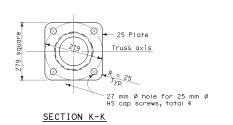
Pole Extension Type	Pole Data			
	Height "H"	Min OD (mm)		Thickness
		BASE	TOP	(mm)
Type 5	1.5	165	152	4.55
Type IO	3.0	184	152	4.55

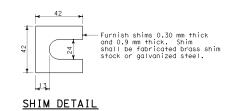


ROUTE













# **GENERAL NOTES:**

#### SPECIFICATIONS

Design : AASHTO specifications for structural supports for highway signs, luminaires and traffic signals, dated 2001

Wind Loadings : 129 km/h AASHTO

#### UNIT STRESSES

Structural Steel: fy = 331 MPa tapered steel tube (Pole) fy = 248 MPa unless noted otherwise noted

### NOTES:

- The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.
- 2. All steel shall be galvanized after fabrication.
- 3. Bolt hole locations may vary at the discretion of the Engineer.

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# **ELECTRICAL SYSTEMS** (LIGHTING STANDARDS TYPE 5 AND TYPE 10 **OVERHEAD SIGN MOUNTED)**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

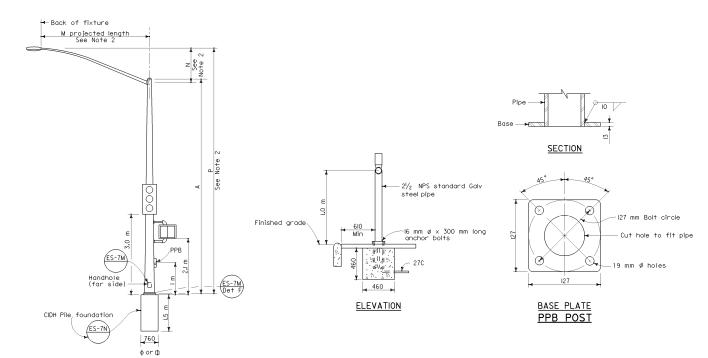
ES-6K

**ELEVATION** 

TYPE 15TS STANDARD

See Note 2

- 1. Pipe dimensions for pedestrian push button post are nominal. See ASTM A6M.
- 2. For additional details and data for Type 15TS Standard, see Standard Plan ES-6A.

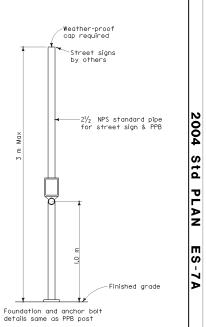


PEDESTRIAN PUSH BUTTON POST

Caltrans

To get to the Caltrans web site, go to: http://www.dot.ca.go

Tillat Sattar C42892



COMBINED STREET SIGN PEDESTRIAN PUSH BUTTON POST

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**ELECTRICAL SYSTEMS** (SIGNAL STANDARDS **PUSH BUTTON POSTS** AND TYPE 15TS STANDARD)

NO SCALE

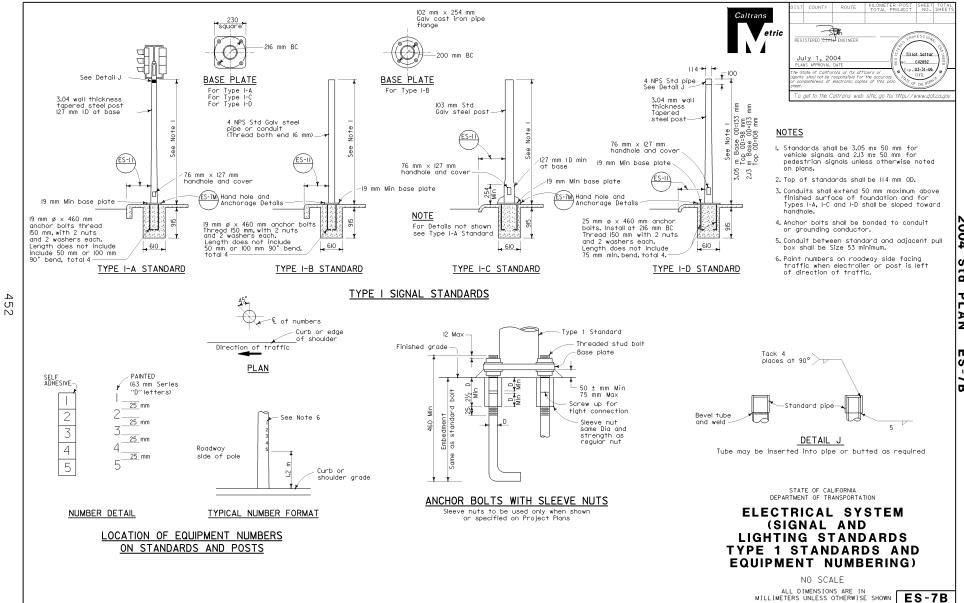
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-7A

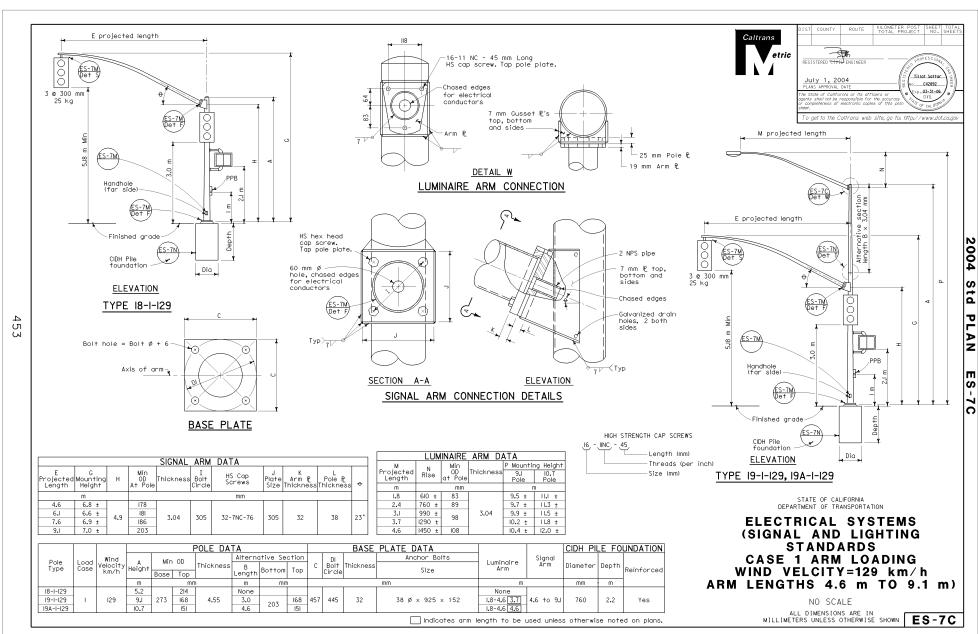
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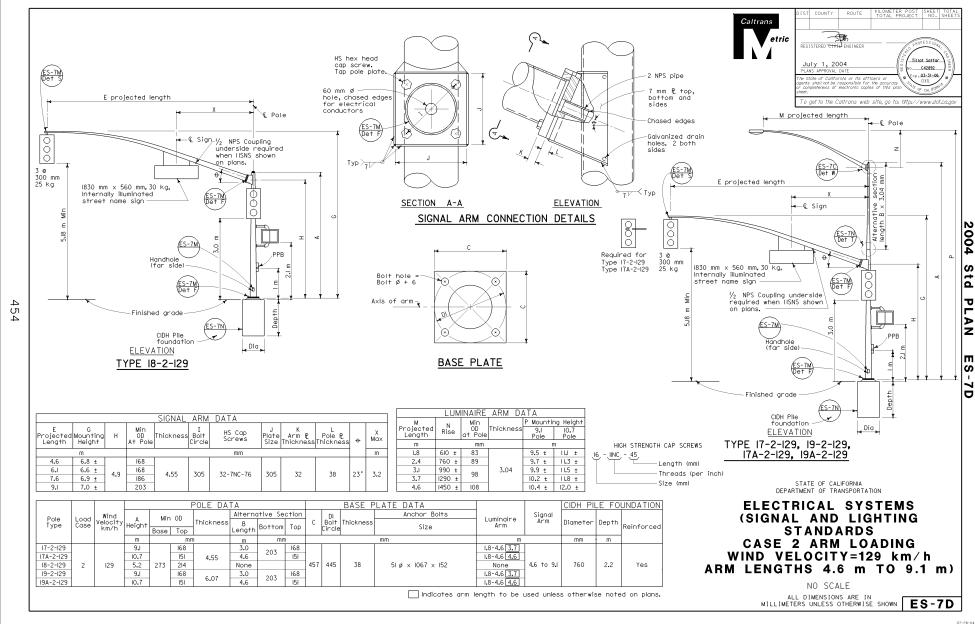
### TYPE 15TS STANDARD (See Note 3)

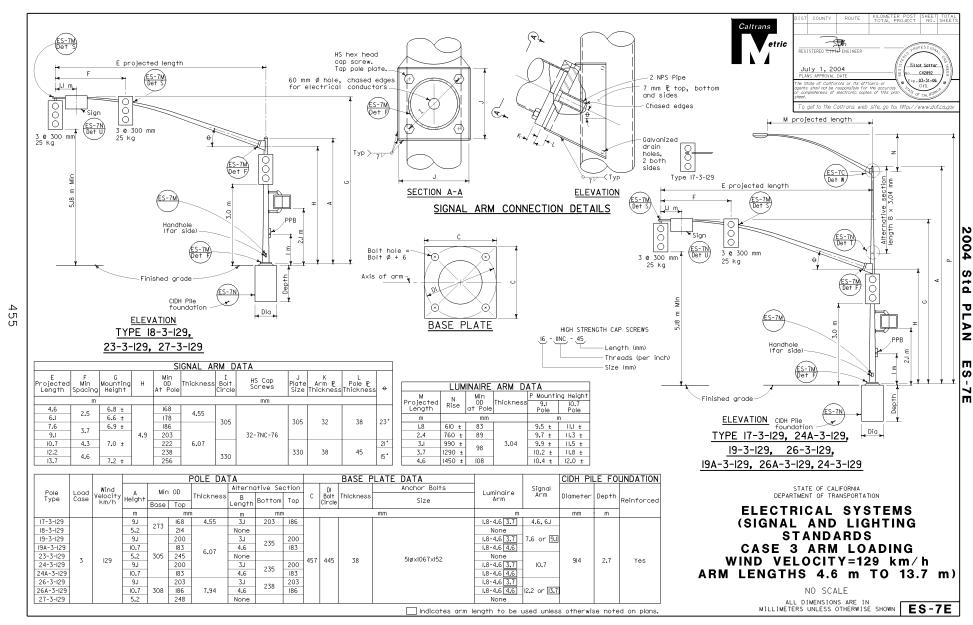
	POLE	DATA		BASE PLATE DATA					
А	Min OD		Wall	_	DI Bolt	Thick-	Anchor Bolts		
Heigh	† Base	Тор	Thickness	١	Circle	ness	Size		
m	mm	mm	mm			n	nm		
9.1	203	98	4.55	305	305	25	32 Ø x 915 x 152		



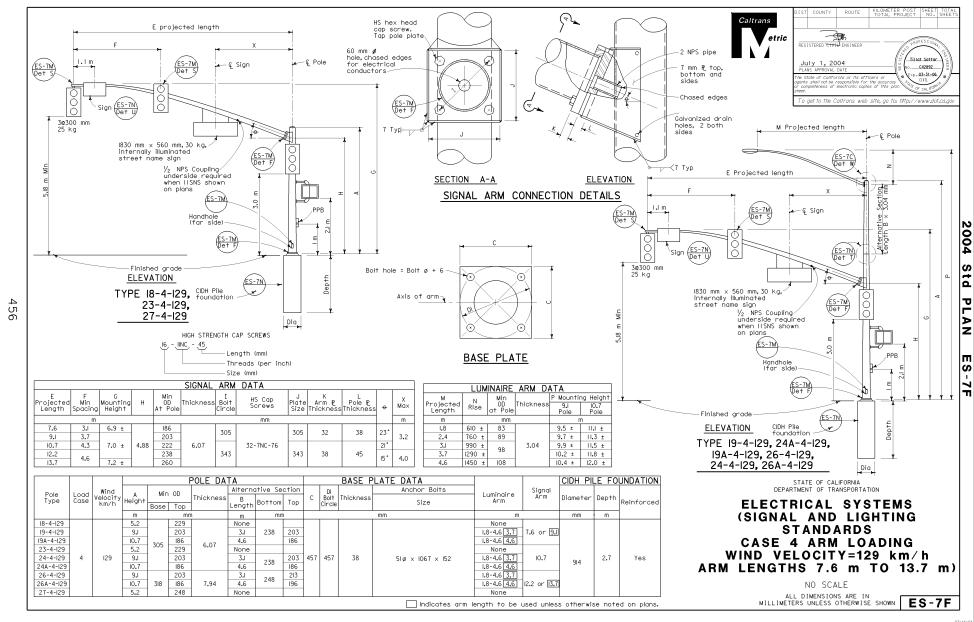


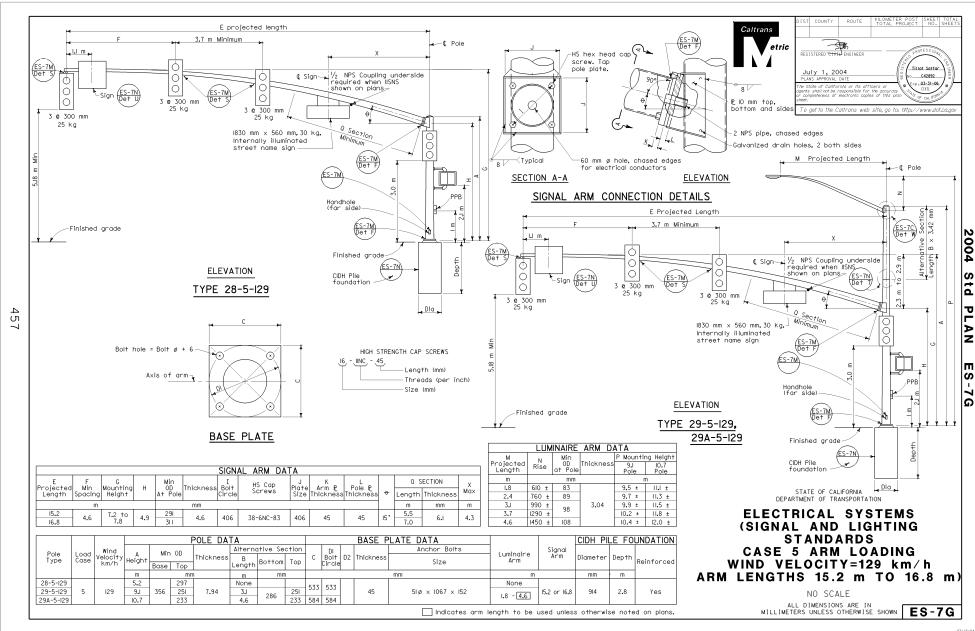


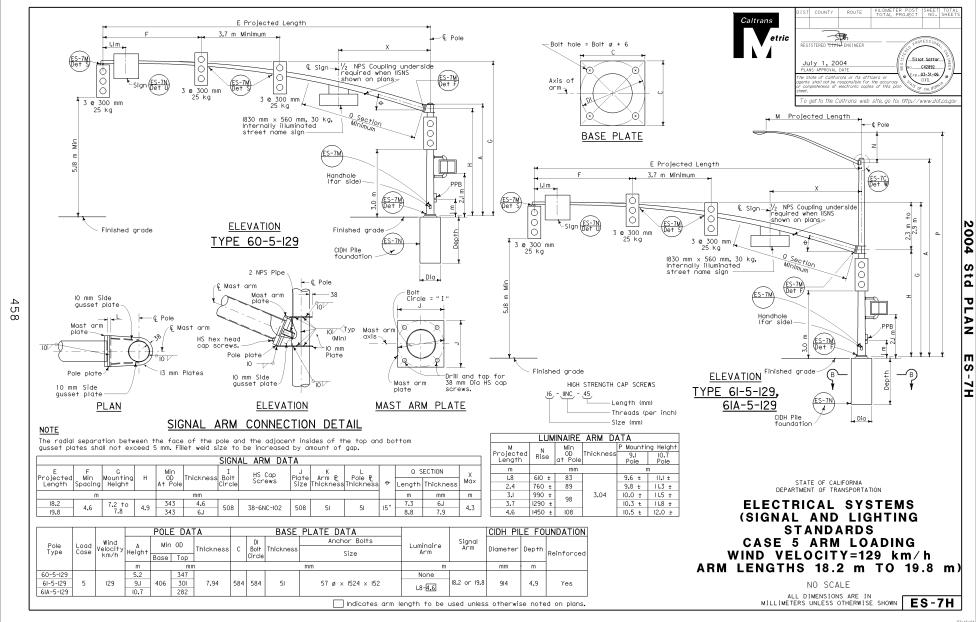


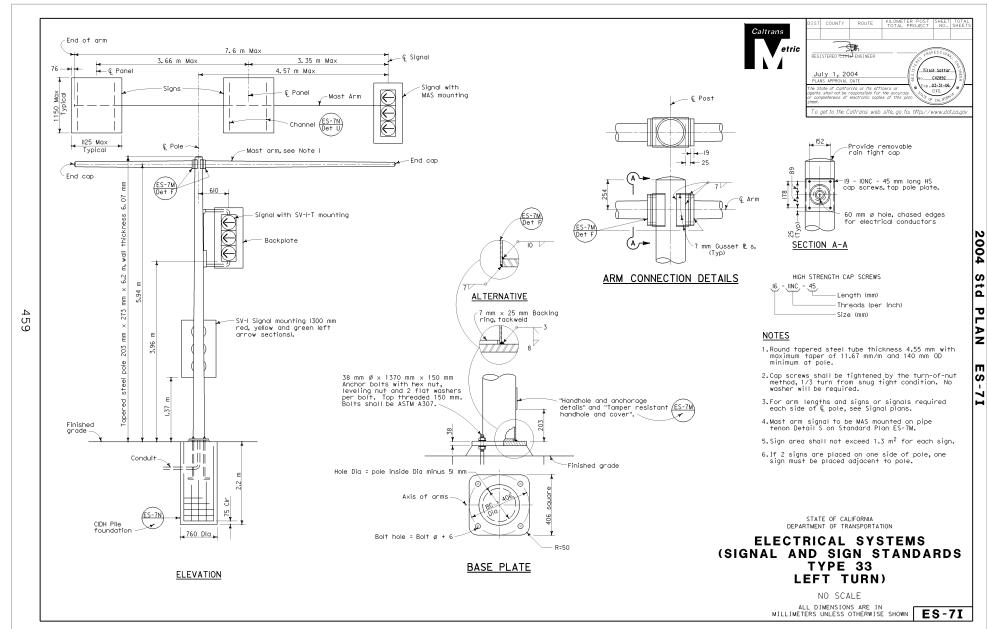


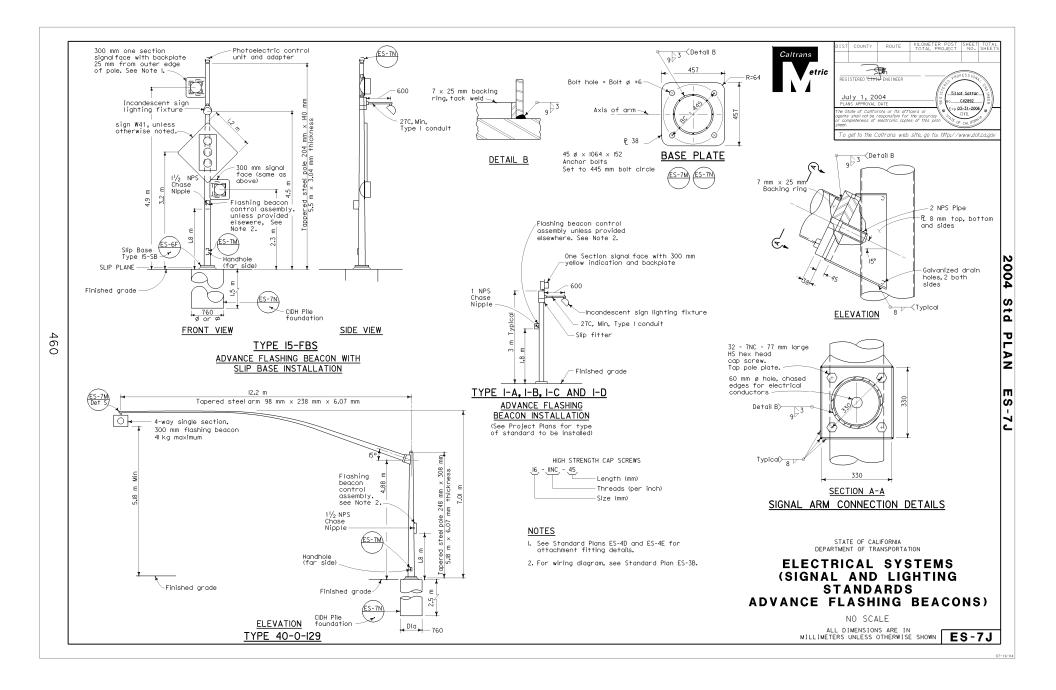
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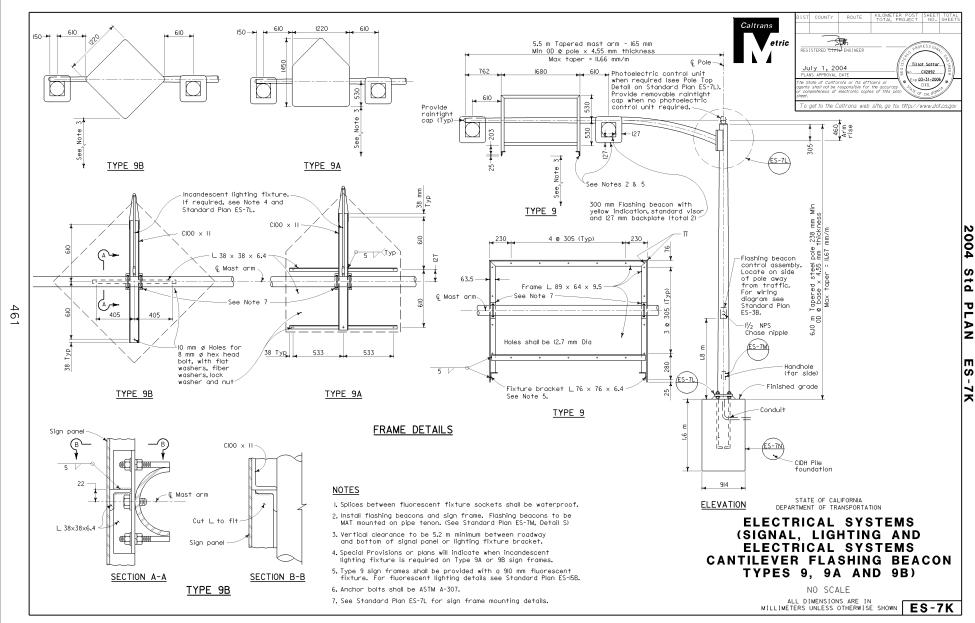


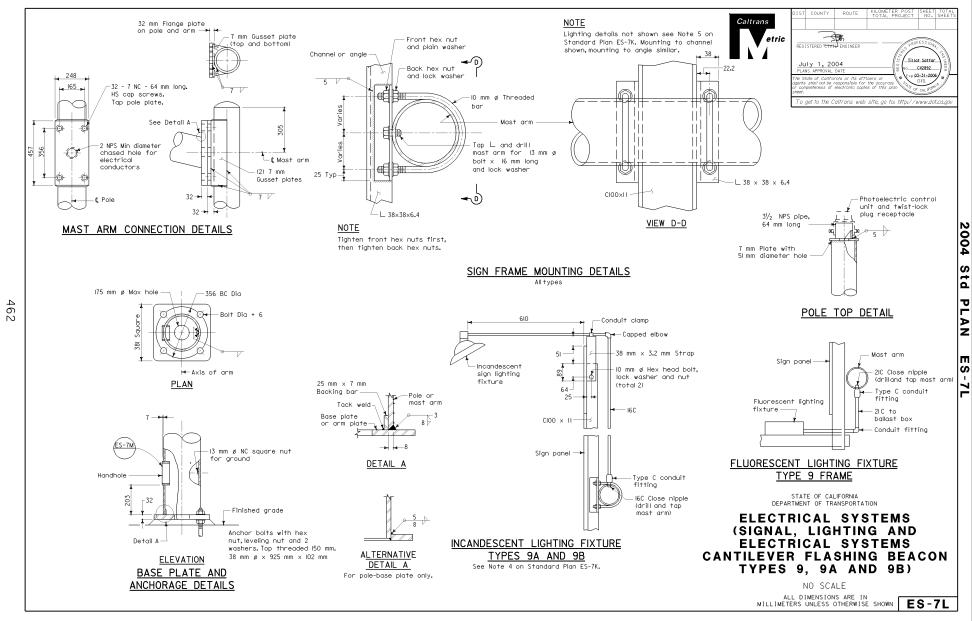




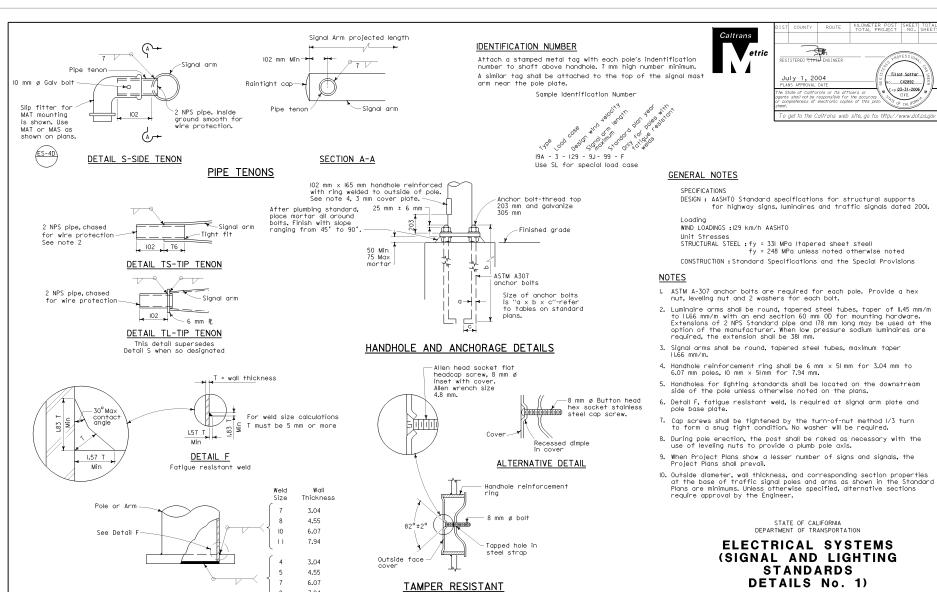












HANDHOLE COVER

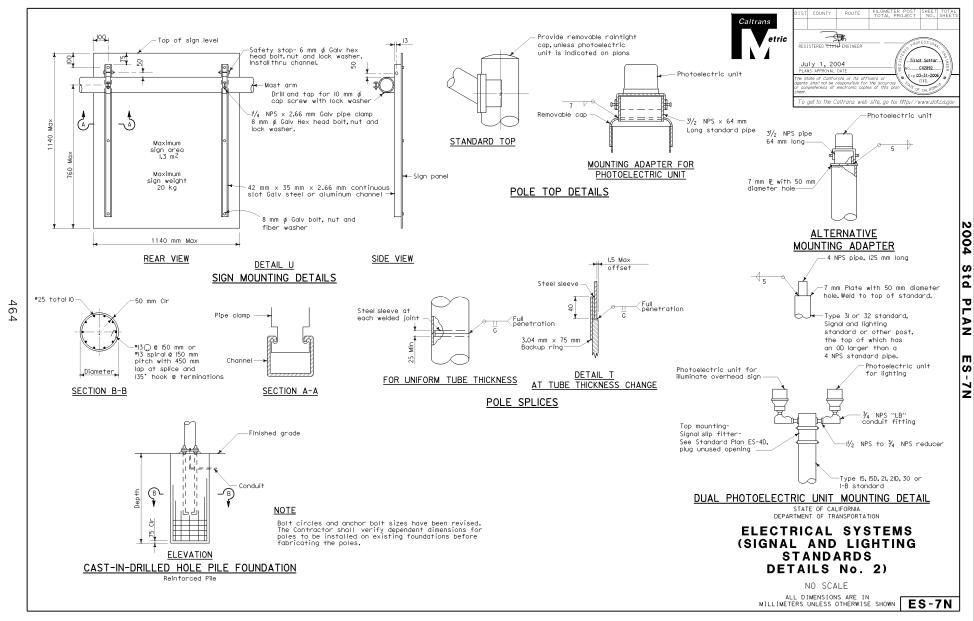
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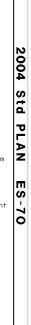
**ELEVATION A** 

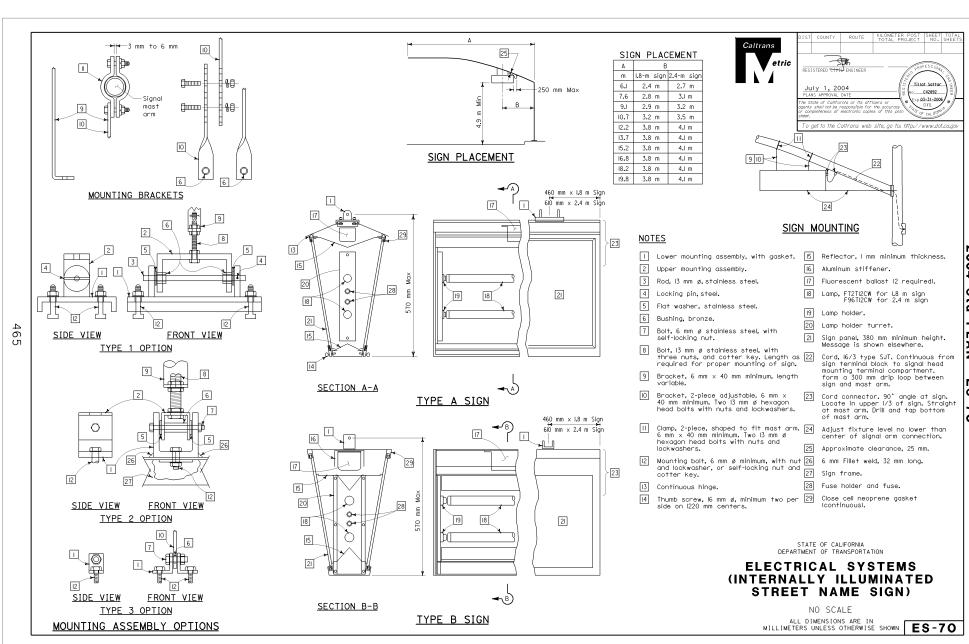
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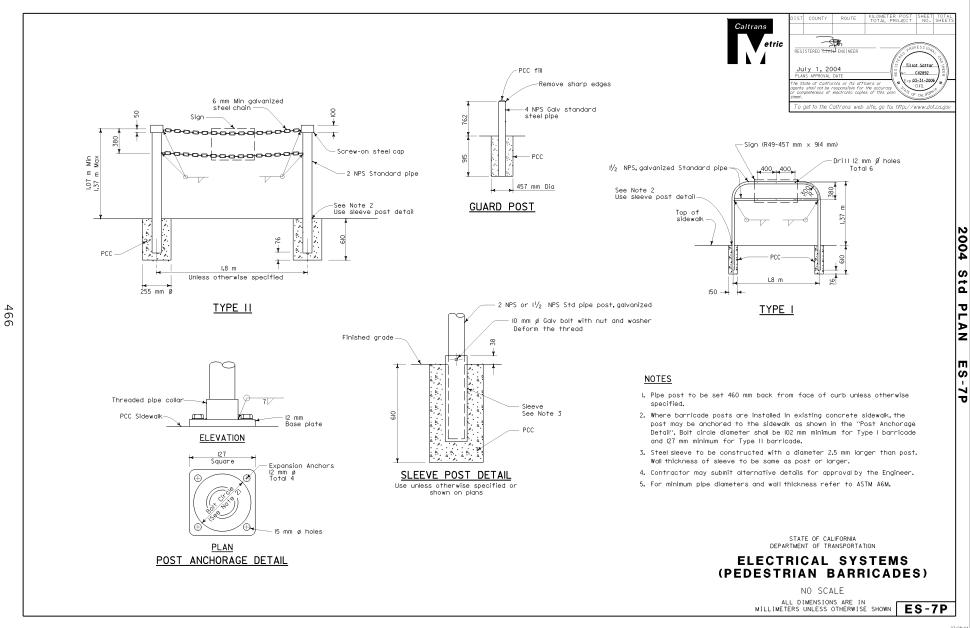
ES-7M

NO SCALE ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN











Edge

3 mm

| \*\* W \*\*

(mm)

(mm)

410



#### DIMENSION TABLE NON-PCC BOX 1.0 Minimum \*\* Minimum Depth Box L \*\* W \*\*

530 ± 370 ± 270 ± 25

750 ± 480 ± 330 ± 25 900 ± 600 ± 430 ± 25

\* Excluding conduit web

Edge Minimum Depth Box (mm) (mm) Thickness 260 510 8 mm (mm) (mm) (mm) Thickness Taper and Extension and Extension 390 260 30 45 mm 590 350 32 50 mm No Extension No Extension 460 710 510 mm 580 910 10 mm 510 mm 50 mm

DIMENSION TABLE

(mm)

\* Excluding conduit web \*\* Top dimension

> (mm) (mm)

r, galvanized after TOP VIEW	No.
Galvanized Z-bar welded frame 13 mm length with sleeve nut with brass bolt finished grade	
Pull box Bonding jumper, See Note 5  PCC	No. 31/2 No. 5 No. 6
80 Min 81 around Arock su  Drain hole Grounding bushing	

Lift hole

Hold-down bolt

Pull box reinforced

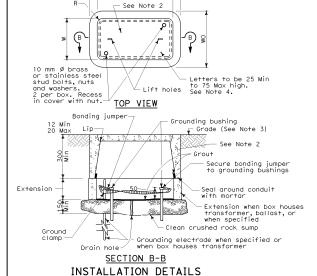
with galvanized Z-bar welded frame

Reinforced 12 mm Min steel

plate cover, fabrication.

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# SECTION A-A No. $3\frac{1}{2}(T)$ , No. 5(T) AND No. 6(T) TRAFFIC PULL BOX



#### NOTES ON PULL BOXES

PULL BOX Minimum \*

PULL BOX Minimum \*

No. 31/2(T) 40 mm

No. 5(T) No. 6(T)

No.

Thickness

25 mm

25 mm 40 mm

Thickness

45 mm 50 mm

CONCRETE BOX

560 mm

CONCRETE BOX

Minimum Depth Bo

and Extension 300 mm

300 mm

300 mm

600 mm

Traffic pull box shall be provided with steel cover and special concrete footing. Steel cover shall have embossed non-skid pattern.

(mm)

430 ± 25

- Steel reinforcing shall be as regularly used in the standard products of the respective manufacturer.
- 3. Top of pull boxes shall be flush with surrounding grade or top of adjacent curb, except that in unpoved areas where pull box is not immediately adjacent to and protected by a concrete foundation, pole or other protective construction, the box shall be placed with its top 30 mm above surrounding grade. Where practicable, pull boxes shown in the vicinity of curbs shall be placed adjacent to the back of curb, and pull boxes shown adjacent to standards shall be placed on side of foundation facing away from traffic, unless otherwise noted. When pull box is installed in sidewalk area, the depth of the pull box shall be adjusted so that the top of the pull box is flush with the sidewalk.
- 4. Pull box covers shall be marked as follows: "SERVICE" Service circuits between service point and service disconnect; "SPRINKLER-CONTROL" Sprinkler control circuits, 50 V or less; "CALTRANS" on all pull boxes, except pull boxes marked "SPRINKLER-CONTROL"; and "TELEPHONE" Telephone service.
  - a) No.  $3\frac{1}{2}$  pull box.
  - 1) "SIGNAL" Traffic signal circuits with or without street or sign  $\,$
  - 2) "ST LIGHTING" Street or sign lighting circuits where voltage is under 600 V.
- b) No. 5, 6, 9 or 9A pull box.
  - "TRAFFIC SIGNAL" Traffic signal circuits with or without street or sign lighting circuits.
  - 2) "STREET LIGHTING" Street or sign lighting circuits where voltage is under 600 V.
  - 3) "STREET LIGHTING-HIGH VOLTAGE" Street or sign lighting circuits where voltage is above 600 V.
  - 4) "IRRIGATION" Circuits to irrigation controller 120 V or more.
  - 5) "RAMP METER" Ramp meter circuits.
  - 6) "COUNT STATION" Count or speed monitor circuits.
  - 7) "COMMUNICATION" Communication circuits.
  - 8) "TOS COMMUNICATIONS" TOS communications line

9) "TOS POWER" TOS power.

CONCRETE OR NON-PCC COVERS

and Extension

NON-PCC BOX

Does Not Apply

Does Not Apply Does Not Apply

Minimum \*\* Minimum Depth Bo

Thickness

10) "TDC POWER" Telephone demarcation cabinet power.

CONCRETE OR NON-PCC COVERS

R

510 ± 350 ± 0 13 mm

Edge

(mm) Thickness Taper

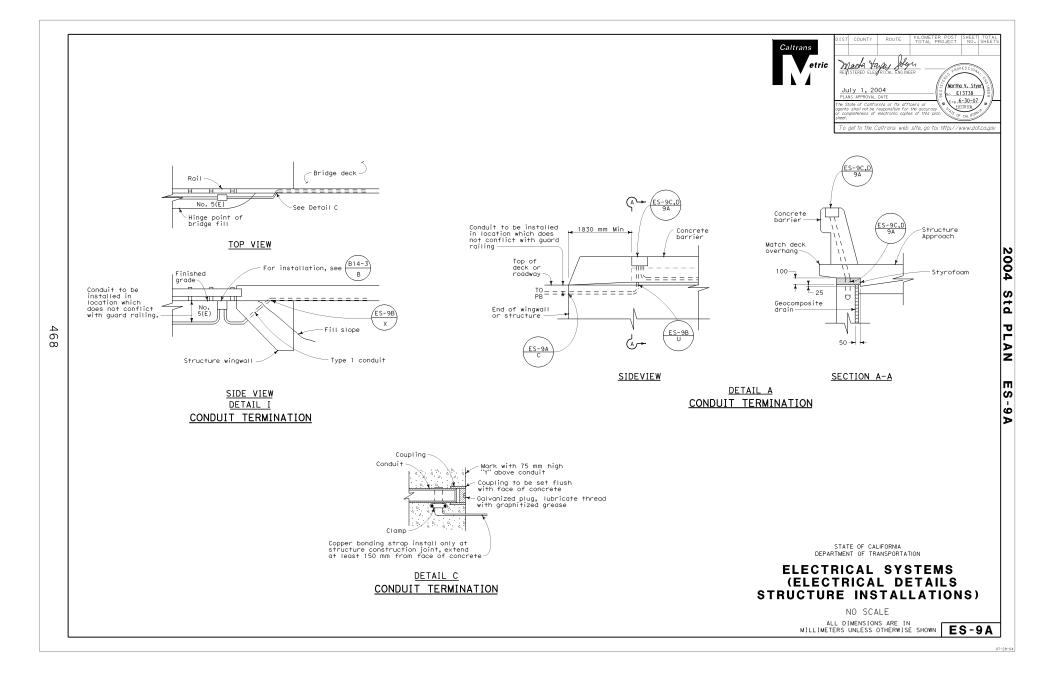
- 11) "CCTV" Closed circuit television circuits.
- 12) "TMS" Traffic monitoring station circuits.
- 13) "CMS" Changeable message sign circuits.
- 14) "HAR" Highway advisory radio circuits.
- 5. Bonding jumper for metal covers shall be 1 m long, minimum.
- The nominal dimensions of the opening in which the cover sets shall be the same as the cover dimensions except the length and width dimensions shall be 3 mm greater.
- Covers and boxes shall be interchangeable with California standard male and female gages. When interchanged with a standard male or female gage, the top surfaces shall be flush within 3 mm. Jop outside edge of concrete covers and pull boxes shall have a 6 mm minimum radius.
- 8. Pull box shall not be installed within the boundaries of new or existing
- 9. Pull boxes for electroliers, post and signal standards shall be located ± 1.5 m from the station of the adjacent electrolier, post or signal standard. Pull boxes shall be placed adjacent to back of curb or edge of shoulder except where this is impractical, a box may be placed in another suitable protected and accessible location.

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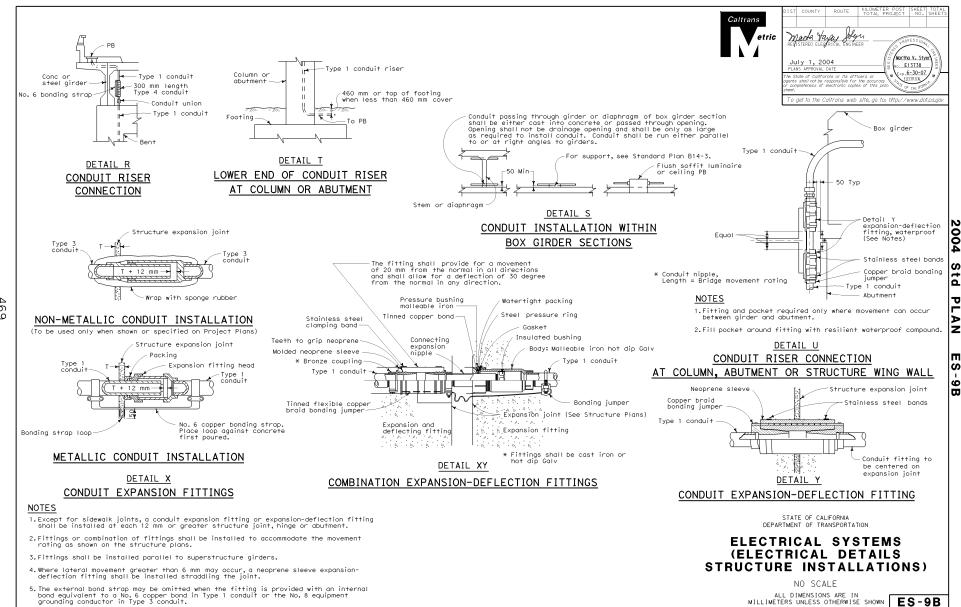
### **ELECTRICAL SYSTEMS** (PULL BOX DETAILS)

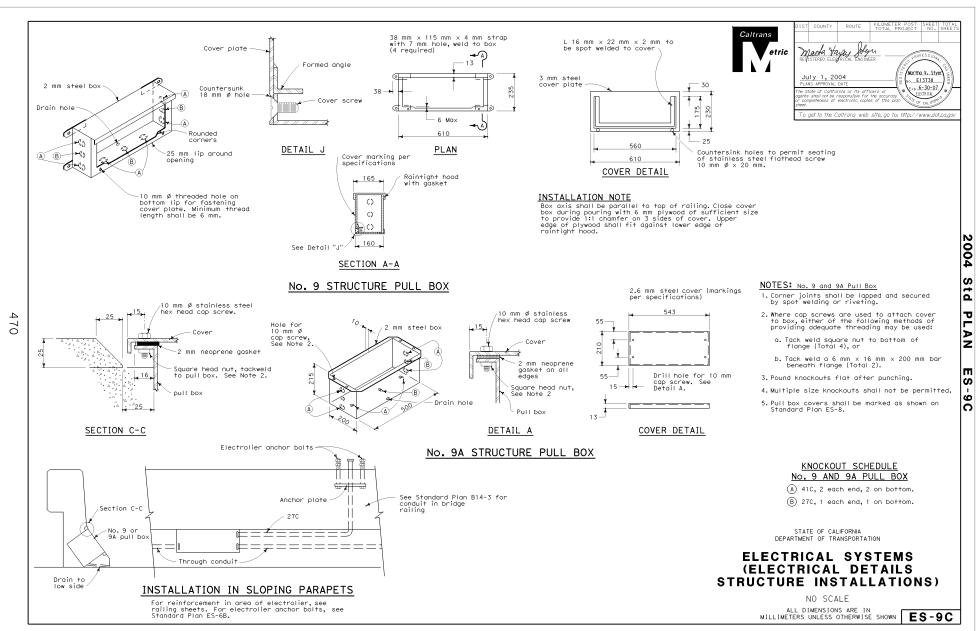
NO SCALE

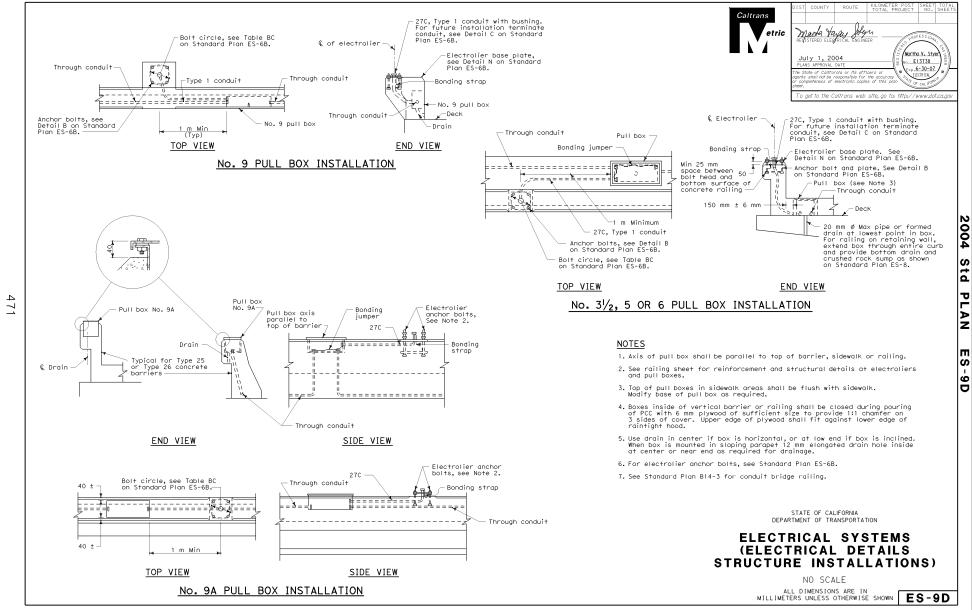
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

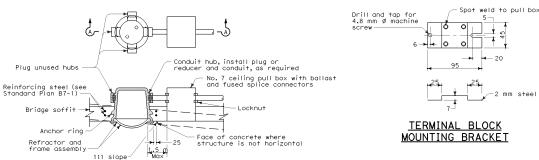














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# TERMINAL BLOCK

130 mm × 150 mm × 100 mm NEMA Type 4 (3.42 mm) junction box (See Notes below)

21C, liquid-tight hub

Conduit and junction box cast in new structure Surface mounted conduit on existing 150 Min Galvanized nut and washer

Hole for the anchors shall be drilled with a non-percussion type drill. When reinforcing steel is encountered, the anchor shall be relocated and abandoned hole plugged with color matching PCC mortar.

Junction box or

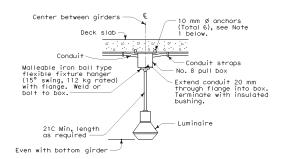
SIDE VIEW

#### SECTION A-A

#### **NOTES**

- 1. Place 6 mm plywood disk in body opening during pouring.
- 2. Install luminaire with axis vertical and "street side" of refractor oriented as indicated on lighting layout.
- Luminaire shall be located so as to provide minimum clearance of 600 mm from inside surface of girders and 300 mm from near face of diaphragm.
- 4. Bridge soffit and ceiling pull box should be installed over same lane.

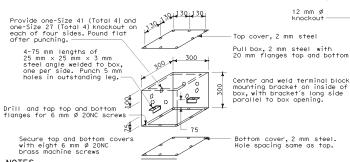
### DETAIL F FLUSH SOFFIT LUMINAIRE INSTALLATION



#### **NOTES**

- 1. Cast-in-place inserts or expansion anchor.
- For future installation, omit suspension conduit and luminaire, close flange with galvanized plug.
- 3. If conduit smaller than the knockout size is used, it shall be bonded to the box.

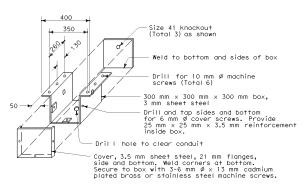
#### DETAIL P PENDANT SOFFIT LUMINAIRE INSTALLATION



#### NOTES

- 1. Install with bottom flange flush with concrete.
- 2. Both covers shall be on a box during pouring.

### NO. 7 CEILING PULL BOX



### NO. 8 PULL BOX

#### **NOTES**

- For existing structures, provide external mounting taps (Total 4).
- 2. For new structures, provide extension ring.

#### DETAIL W WALL LUMINAIRE INSTALLATION (Typical)

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**ELECTRICAL SYSTEMS** (ELECTRICAL DETAILS STRUCTURE INSTALLATIONS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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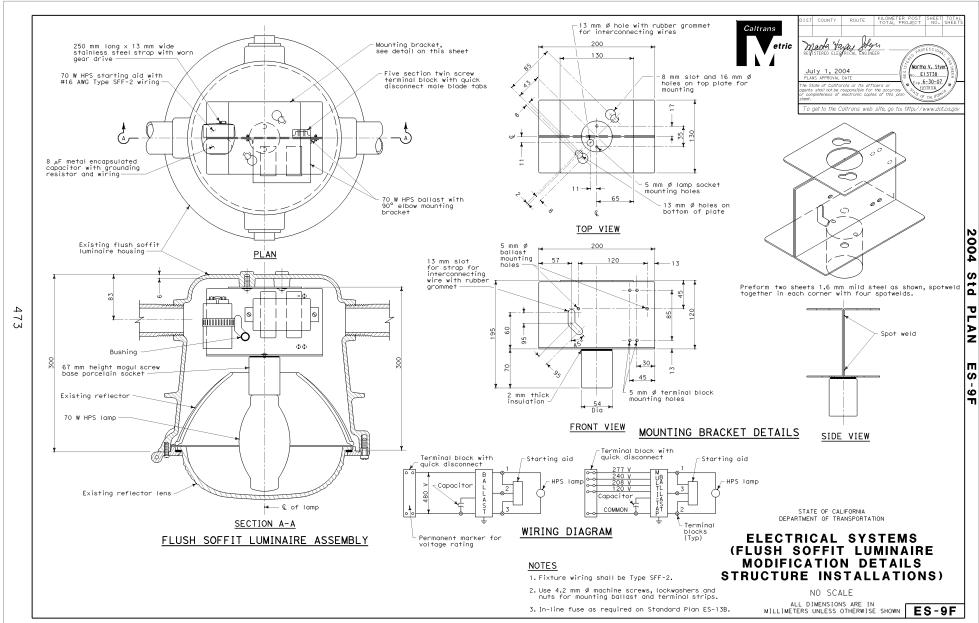
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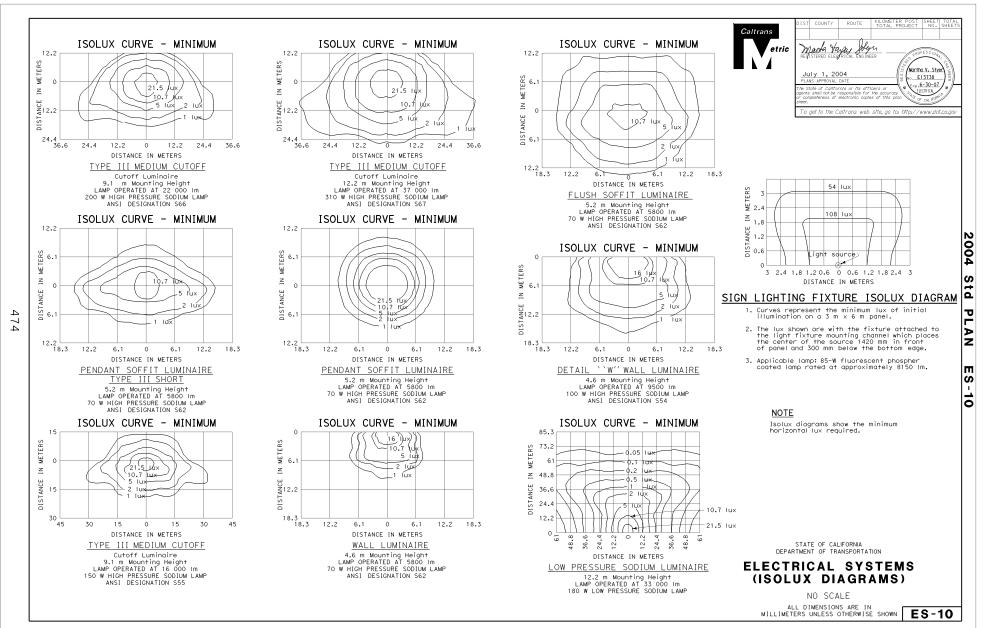
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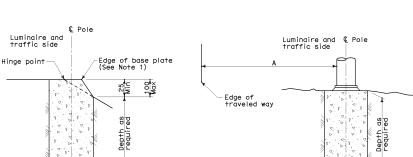








STANDARD TYPE	SETBACK (DIMENSION A)					
32	9 m Min					
31, 36-20A	6 m Min					
15, 15D, 15-SB, 30	Mast Arm Length (Min)					



# STEEPER THAN 1:4 See Note 2 See Note 2 See Note 2

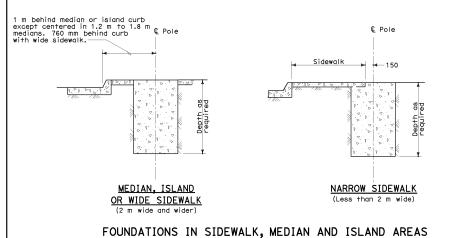
# FLAT SECTIONS, CUT OR FILL SLOPES 1:4 OR FLATTER

# FOUNDATIONS ADJACENT TO ALL ROADWAYS EXCEPT IN SIDEWALK, MEDIAN AND ISLAND AREAS

FILL SLOPES

# <u>NOTES</u>

- Where a portion of the foundation is above grade, the top edges shall have a 25 mm chamfer.
- 2. Horizontal setbacks on cut and fill slopes steeper than 1:4 shall not exceed the distance shown for flat sections.



Luminaire and traffic side

Edge of base plate (See Note 1)

Hinge point

♠ Pole

**CUT SLOPES** 

Shape to clear

foundation

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# ELECTRICAL SYSTEMS (FOUNDATION INSTALLATIONS)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

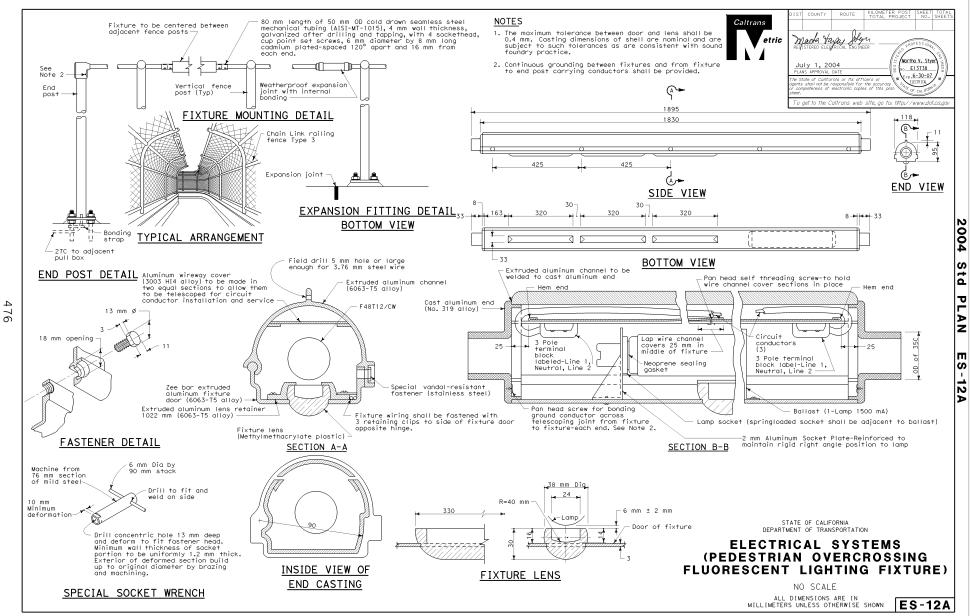
ES-11

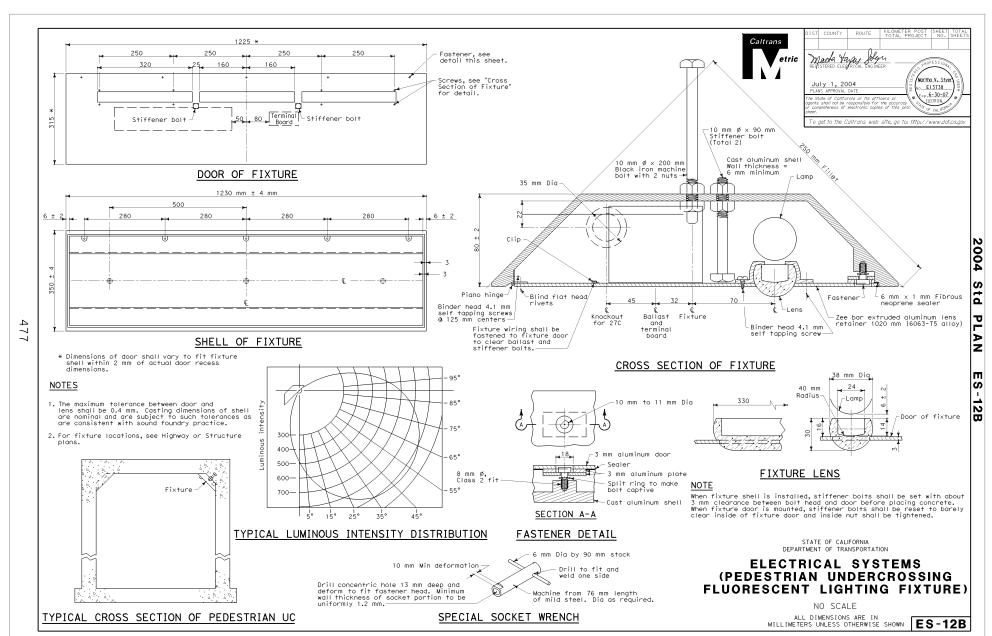
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Std

PLAN

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he State of California or its officers or

For low voltage circuits electrical filler compound, insulating pad or rubber tape

Splice area

TYPE "C" SPLICE

Splice area

TYPE "T" SPLICE

Between 1 free-end and 1 through conductor

50 1 20.

Penciling - 6 mm Min

"C" Shaped compression

Penciling - 6 mm Min

For low voltage circuits electrical filler compound, insulating pad or rubber tape

"C" Shaped compression connector

connector

50 20 PVC tape Penciling - 6 mm Min For high voltage circuits-high voltage tape or Butt type crimp or
For low voltage circuitselectrical filler compound,
insulating pad or rubber tape.

Splice Area

# TYPE "S" SPLICE

Splice Area \_ 50 \_ 20. transpunia. PVC tape Penciling - 6 mm Min For low voltage circuits-electrical filler compound, insulating pad or rubber tape. Butt type crimp

# TYPE "ST" SPLICE

Size to accommodate Min of 2#14 conductors

#### **NOTES**

1. Dimensions are minimum.

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2. Rubber tapes shall be rolled after application.

#### INSULATION METHODS

#### Low Voltage Circuits (0-600 V)

#### METHOD "B"

- Completely cover the splice area with electrical insulating coating and allow to dry.
- Apply 2 layers of electrical insulating pad with minimum thickness of 4 mm each layer or 2 layers, half lapped, synthetic oil resistant, self fusing rubber tape.
- 3. Apply 3 layers half lapped polyvinyl chloride tape.
- Cover entire splice with electrical insulating coating and allow to dry.

#### High Voltage Circuits (Over 600 V)

- Completely cover the splice area with electrical insulating coating and allow to dry.
- 2. Apply high voltage tape to a minimum thickness equal to original insulation.
- 3. Apply 3 layers half lapped polyvinyl chloride tape.
- 4. Cover entire splice with electrical insulating coating and allow to dry.

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# **ELECTRICAL SYSTEMS** (SPLICING DETAILS)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-13A

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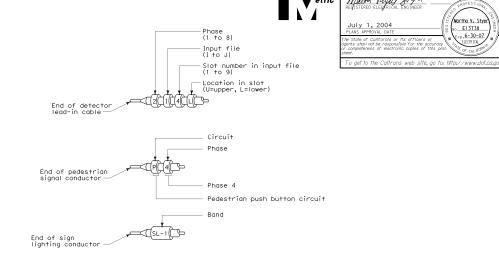
PVC tape

PVC tape

S P

Splice





TYPICAL BANDING OF CONDUCTOR ENDS

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FRONT VIEW

FRONT VIEW

STEP 2

SIDE VIEW

Bonding bushing required

Bonding strap

479

STEP 1

Make tight kink in each conductor at or somewhere below shear plane

Primary lines of multiple ballasts shall be provided with fused connectors. Fuse ratings shall be as noted below.

	FUSE VOLTAGE RATING		FUSE CURRENT RATING														
CIRCUIT		HPS LAMP BALLAST							LOW PRESSURE SODIUM BALLAST					INDUCTION MULTIPLE TO MULTIPLE SIGN LIGHTING TRANSFORMERS (PRIMARY SIDE)			
		70 W	100 W	150 W	200 W	250 W	310 W	400 W	35 W	55 W	90 W	135 W	180 W	85 W	1 KVA	2 kVA	3 kVA
120 V	250 V	5	5	5	5	6	10	10	5	5	8	10	10	5	10	25	35
240 V	250 V	5	5	5	5	5	5	5	3	3	4	5	5	5	6	10	20
480 V	500-600 V	5	5	5	5	5	5	5	2	2	2	3	3	1*	3	6	10

Continue kink to at least 90° position as indicated in step 2.

Slack in conductors removed

FUSE RATINGS FOR FUSED CONNECTORS

### LUMINAIRE BALLAST FUSING

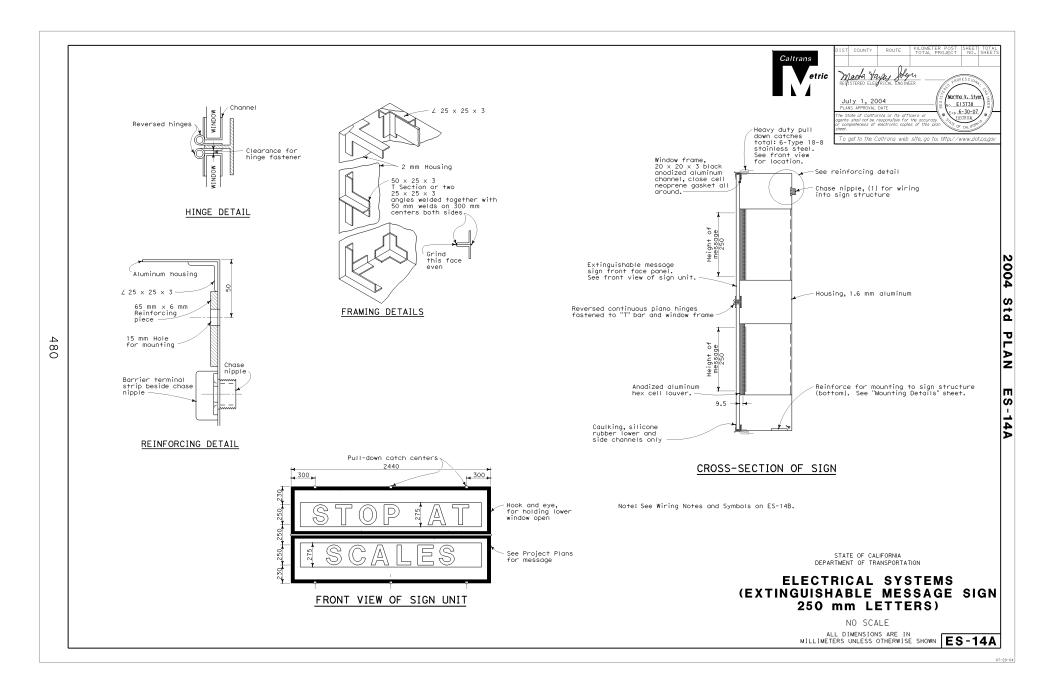
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# **ELECTRICAL SYSTEMS** (WIRING DETAILS AND **FUSE RATINGS**)

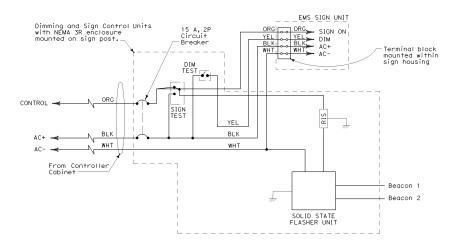
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-13B

<sup>\*</sup> See Standard Plan ES-15D, Type SC3 Control.







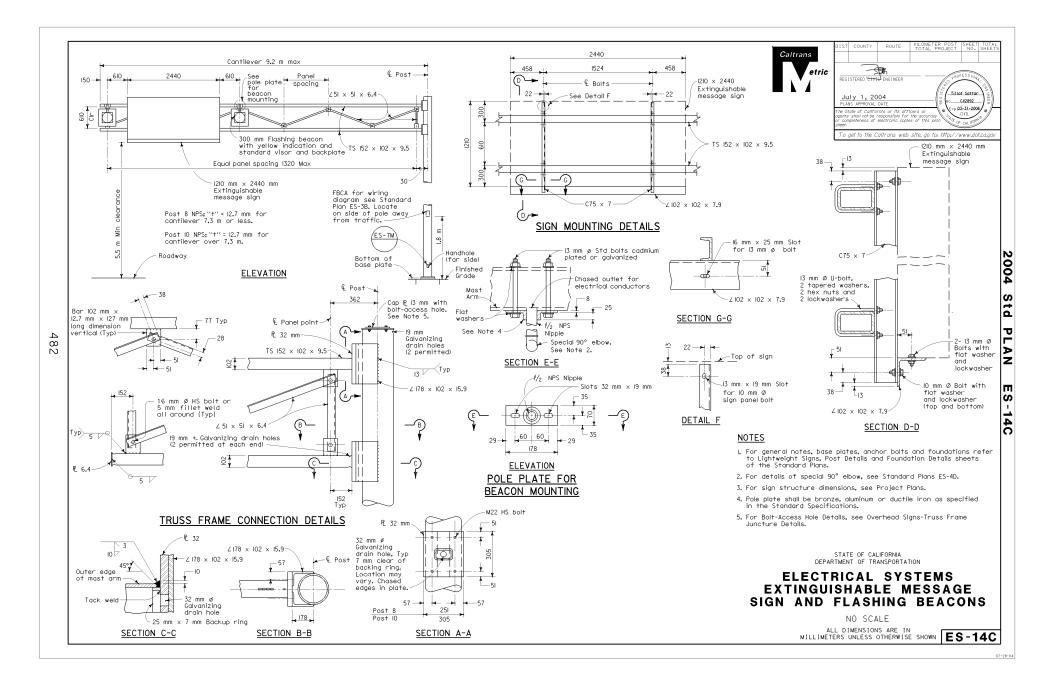
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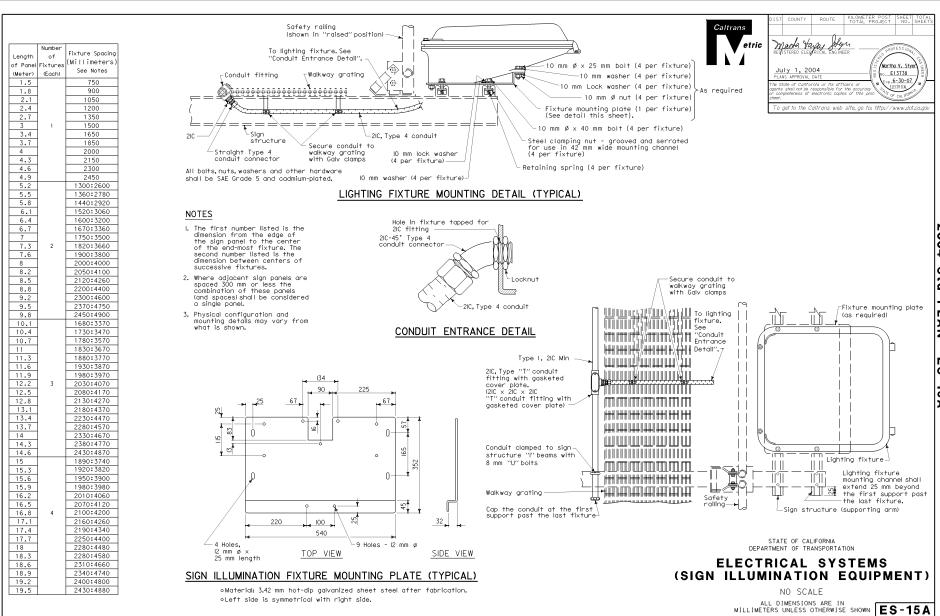
# **ELECTRICAL SYSTEMS** (EXTINGUISHABLE MESSAGE SIGN

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-14B







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COUNTY ROUTE KILOMETER POST TOTAL PROJECT mada tagas d

Martha V. Stve July 1, 2004 . E13738 p\_6-30-07

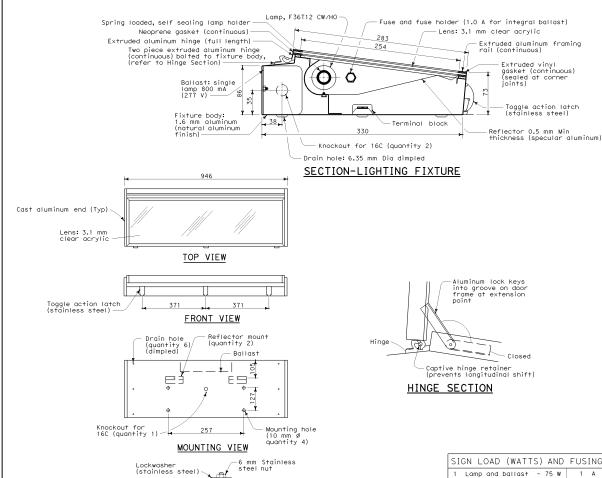
get to the Caltrans web site, go to: http://www.dot.ca.g

he State of California or its officers or

- Wiring between ballast box and nearest fixture and between fixtures shall be run in 16C, Type 4 conduit.
- Conduit shall be secured to nearest member using one-hole galvanized mallable iron or steel straps at 1.5 m maximum centers and brass machine screws tapped into the member.
- 3. Ballasts and terminal boards shall be marked with legible symbols. Conductors shall be tagged and their identification marked on the corresponding terminal on the terminal board as shown on the Typical Fixture Wiring Diagram. An alternative cover design shall be submitted for approval.
- 4. Ballast shall be one, two or three lamp types as required, rated at 800 mA.
- 5. Each ballast shall be fused with 32 mm  $\times$  6 mm slow-blow glass tube fuse.
- 6. Fuseholder shall be a panel mounted type, with screw type finger knob.
- At the option of the Contractor, the fixture may be supplied with an integral ballast. The ballast box will not be required when fixtures with integral ballasts are



NOTES



-2 mm Stainless

Cadmium plated steel clamping nut with 6 mm Ø x 32 mm stainless steel machine bolt. Nuts shall be grooved and shaped for use in

41 mm wide continuous slot channel.

Fixture shell-

Furnish 4 sets of

mounting hardware (as shown) attached to fixture

Part of sign) structure

DETAIL "M" FIXTURE MOUNTING

ON CONTINUOUS SLOT CHANNEL

 $\infty$ 

SI	GN	LC	)AD	(WA	TT	S)	Α	ИD	FUS	ING
1	Lam	р	and	ballo	ıs†	-	75	W	1	Α
2	Lam	ps	and	ball	ast	-	150	W	2.5	Α
3	Lam	ps	and	ball	ast	-	225	W	3	Α

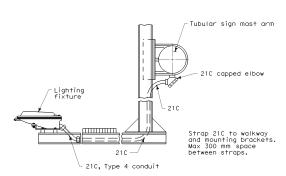
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## **ELECTRICAL SYSTEMS** (915 mm FLUORESCENT SIGN **ILLUMINATION EQUIPMENT)**

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-15B





mada taga Hyn Martha V. Styer E13738 6-30-07 To get to the Caltrans web site, go to: http://www.dot.ca.go

SIDE VIEW FRONT VIEW TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS BRIDGE MOUNTED

Sian panel

"L" conduit fitting

Conduit union

\_\_\_Lighting / Walkway fixture /

NEMA 3R enclosure

Secure to end of sign frame with 10 mm, No. 16 machine screw.

NEMA 3R enclosure for transformer (as required)

 $\infty$ ű Contactor and test switch enclosure shall be readily accessible from the sign walkway.

Sign panel

Walkway

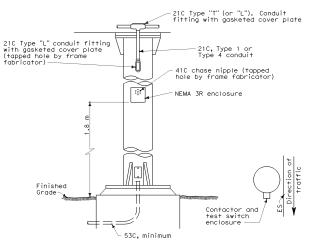
NEMA 3R enclosure

NEMA 3R enclosure for transformer (as required)

> TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS **TUBULAR**

"T" or "L" conduit fitting. Drill holes for conduit Clearance hole for conduit installation (by frame fabricator) Location of conduit and enclosure shall be as directed by the Engineer contactor and test switch enclosure — TWO POST SIGN NEMA 3R enclosure 53C (Min) secure to Finished Grade-SINGLE POST SIGN SECTION A-A

> TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS BOX BEAM POST



TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS ROUND POST

#### NOTES

Caltrans

- 1. Type 4 conduit shall be secured to the nearest walkway bracket using one-hole galvanized malleable iron or steel straps and brass machine screws tapped into the bracket.
- 2. See Overhead Signs Standard Plans for overhead signs and frame jucture details for photoelectric unit installation.
- 3. Enclosures and straps shall be secured by 6 mm maximum

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# **ELECTRICAL SYSTEMS** (SIGN ILLUMINATION EQUIPMENT)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-15C





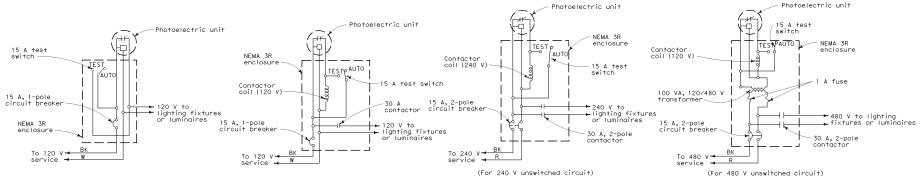
get to the Caltrans web site, go to: http://www.dot.ca.



2. Voltage rating of photoelectric controls shall conform to the service voltage indicated on the plans. 3. Terminal strip shall be provided for wiring to fixtures.

NOTES (FOR LIGHTING AND SIGN ILLUMINATION CONTROL) The ballast voltages of lighting fixtures and luminaires shall match line service voltages.

4. Types SC1A and SC2A are similar to Types SC1 and SC2 respectively except test switch and wiring are not required.



#### TYPE LC1 CONTROL

 $\infty$ 

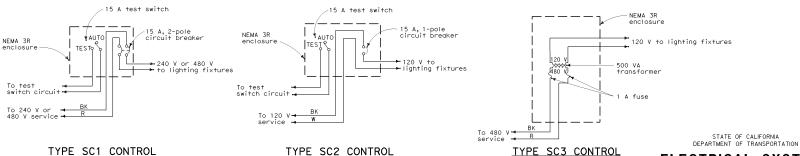
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For 120 V unswitched circuit with no more than 800 W load.

# TYPE LC2 CONTROL

For 120 V unswitched circuit

#### TYPE LC3 CONTROL



For 240 V or 480 V switched circuit, see Note 4 for Type SC1A

# TYPE SC2 CONTROL

For 120 V switched circuit, see Note 4 for Type SC2A

### TYPE SC3 CONTROL

(For 480 V switched sign circuit)

### **ELECTRICAL SYSTEMS** (LIGHTING AND SIGN **ILLUMINATION CONTROL)**

NO SCALE

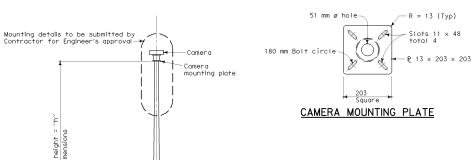
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-15D

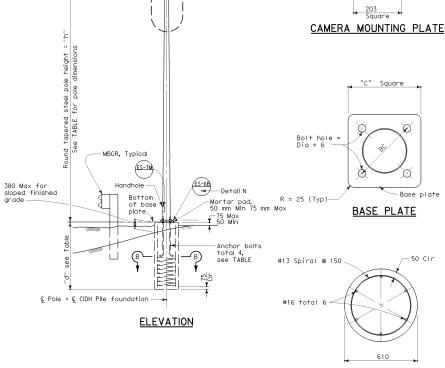
	Pole Data			Base Plate Data			"d"	Structural		
Pole Type	Height "h"	Min OD (mm)		Thickness "C"	Thickness	Anchor Bolts (mm)		610 mm ø CIDH Pile	Steel kg plus 3.5%	
		BASE	TOP	(mm)	(mm)	(mm)	SIZE	BC=BOLT CIRCLE	(m)	Galvanizing
CCTV 25	7.62	187	98	4. 55	305	25. 4	25 × 920 × 102	267	I. 83	180
CCTV 30	9.14	203	98	4.55	305	25. 4	25 × 920 × 102	279	2.13	215
CCTV 35	10.67	219	98	4. 55	305	25. 4	25 × 920 × 102	305	2.13	250
CCTV 40	12.19	238	98	4. 55	330	25. 4	32 × 920 × 102	330	2.13	295
CCTV 45	13.72	254	98	4.55	330	25. 4	32 × 920 × 102	343	2.44	340

SECTION B-B









 $\frac{\infty}{}$ 

## GENERAL NOTES:

#### SPECIFICATIONS

Design: AASHTO Standard specifications for structural supports for highway signs, luminaires and traffic signals dated 2001.

#### **LOADING**

Wind Loadings : I29 km/h AASHTO

### UNIT STRESSES

Structural Steel: fy = 331 MPa tapered steel tube (Pole)
fy = 248 MPa unless noted otherwise noted
Anchor boits = A307
Reinforced Concrete: f'c = 25 MPa
fy = 276 MPa

### NOTES:

- The Contractor shall verify controlling field dimensions before ordering or fabricating any material.
- 2. All steel shall be galvanized after fabrication.
- During pole erection, the post shall be raked as necessary with the use of leveling nuts to provide a plumb pole axis.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

# **ELECTRICAL SYSTEMS** (CLOSED CIRCUIT TELEVISION POLE DETAILS)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN ES-16A

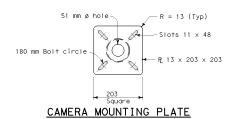


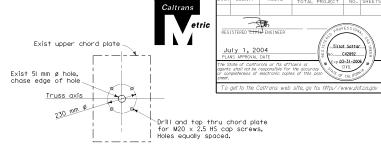
Thickness

4.55

4.55

4.55





UPPER CHORD PLATE

16 - IINC - 45

**GENERAL NOTES:** 

SPECIFICATIONS

UNIT STRESSES

NOTES:

HIGH STRENGTH CAP SCREWS

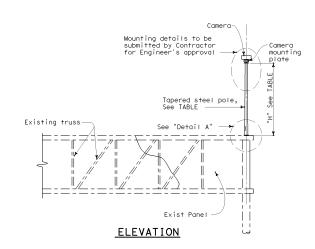
Wind Loadings : 129 km/h AASHTO

Lenath (mm)

-Size (mm)

Threads (per inch)

ROUTE



Pole Data

Min OD (mm)

RASE

116

133

151

TOP

98

98

98

Extension

CCTV 5

CCTV IO

CCTV 15

 $\infty$ 

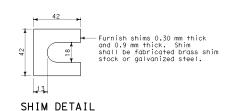
 $\alpha$ 

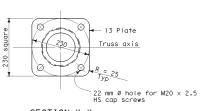
Height "H

1.5

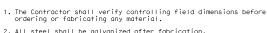
3.0

4.5





SECTION K-K



Design : AASHTO Standard specifications for structural supports for highway

fy = 248 MPa unless noted otherwise noted

signs, luminaires and traffic signals dated 2001.

Structural Steel: fy = 331 MPa tapered steel tube (Pole)

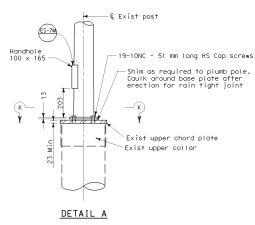
- 2. All steel shall be galvanized after fabrication.
- 3. Bolt hole locations may vary at the discretion of the Engineer.

DEPARTMENT OF TRANSPORTATION

## **ELECTRICAL SYSTEMS** (CLOSED CIRCUIT TELEVISION POLE DETAILS-OVERHEAD SIGN MOUNTED)

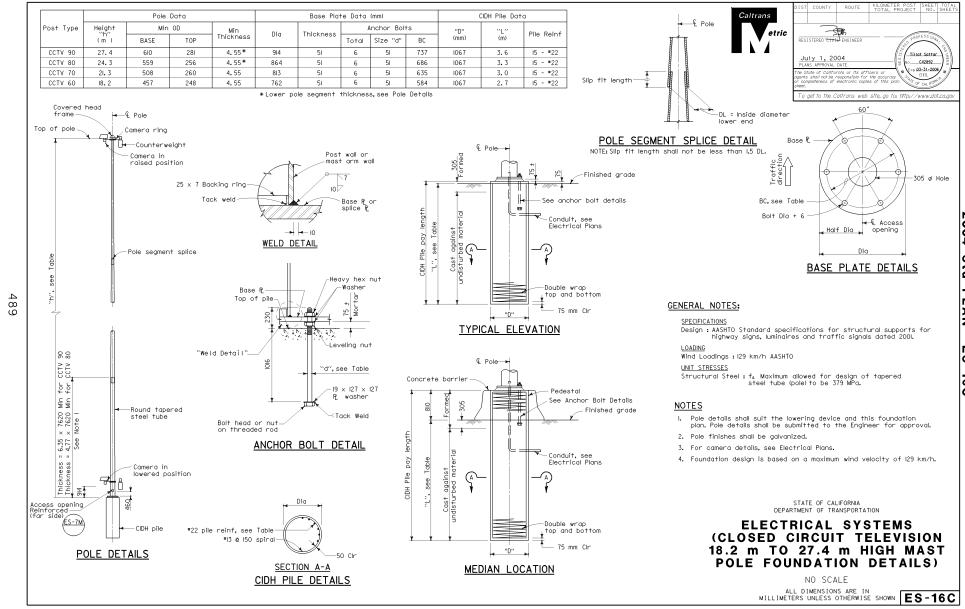
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN ES-16B



STATE OF CALIFORNIA





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